The LADIES *Diary:*
OR, THE
Woman's ALMANACK,
For the YEAR of our LORD, 1744.

Being BISSEXTILE, or LEAP-YEAR.

Containing many Delightful and Entertaining PARTICULARS,
Peculiarly Adapted for the *Use* and *Diversion* of the

FAIR-SEX.

Being the *Forty First* ALMANACK Publish'd of this Kind.

1. HAIL! Happy LADIES of the *BRITISH* Isle,
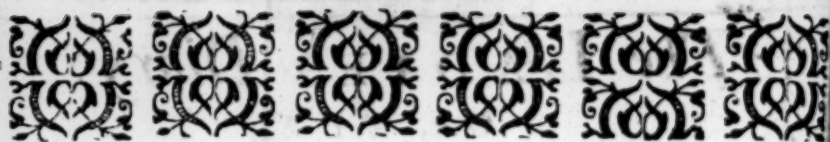On whom the GRACES and the MUSES smile.

4. NO more let *SCYTHIA* vaunt her FEMALE-HOST,
Nor their SEMIRAMIS th' *Assyrians* boast:
WIT join'd to BEAUTY, *Fame* shall now record;
Which lead more Captive than the Conqu'ring Sword.

OF THE
MATHEMATICKS.

HAVING *in the laſt* Year's *DIARY ſaid ſom* thing *of the* Algebraic ART, *I purpoſe to go* and *Then ſhall be naturally led to ſet forth the Pe*ſection *of that ſurprizing Doctrine of* FLUXIONS.

THE Elements of *ALGEBRA have been ſo* eſtab *Treated of, by Many* AUTHORS, *that One knows* mina p *which to* chooſe. *Kerſey's Folio is very full of this Specie* ART, *as well as others, both* Foreigners *and* Engliſhmen; h *moſt of Them, have too much* neglected *the* Application *of* to Geometry, *which We have endeavour'd to Supply in* Volume *mention'd in this* DIARY. *Sir* Iſaac Newt *Univerſal Arithmetick is an Excellent Performance:* Mr. Wa INTRODUCTION, *I believe, has made more* Mathematic *than any other Single Book: But,* Dr. Sanderſon's Algebra *the moſt compleat of any I have ever ſeen, if its* Pomp Shew *and* Bulk *do not* affright *a* Learner, *or, he be thought to ſay* too much. *Mr. Hammond has ſince Publiſh a ſmall Introduction, in* Octavo, *which ſeems well Deſign'd* Compil'd *to* Introduce *that* Science.

ALGEBRA has been applied to the Conſideration Calculus *of* Infinites; *from whence a* New, *and very* tenſive *Branch of Knowledge has aroſe, call'd the Doctrine* FLUXIONS, *or, the* Calculus Difforentialis, *the Inven of The* Illuſtrious *Sir* Iſaac Newton, *who ſays, The* Anal Method *ſtands oppoſed to the* Synthetic. ———

‘ *AS in* Mathematicks, *ſo in* Natural Philoſophy, ‘ Inveſtigation *of difficult Things by the* Analytic Method, ‘ *to precede the* Method *of* Compoſition. *The* Analyſis *in making* Experiments *and* Obſervations, *and in dra* ‘ general Concluſions *therefrom by* Induction, *and admitting* ‘ *no* Objections *againſt the* Concluſions, *but ſuch as are d* ‘ *from* Experiments, *and other* certain Truths.

‘ A N

" AND, tho' the Arguing *from* Experiments *and* Obſervations *by* Induction, *be no* Demonſtration *of* General Concluſions; *yet it is the beſt* Way *of* Arguing, *which the* Nature *of the* Things *admits of*; *and may be eſteem'd ſo much the* Stronger, *as the* Induction *is more* General. *And, if no* Exception *occur from* Phœnomina, *the* Concluſion *may be* Pronounc'd Generally. *By this* Way *of* Analyſis, *we may proceed from* Compounds *to* Ingredients; *and from* Motions *to the* Forces *producing Them*; *and in* General, *from* Effects *to their* Cauſes; *and from more* Particular *Cauſes, to more* General *Ones*, 'till *the* Argument *ends in the moſt* General. ———— *This is the* Analytic Method.

THE Synthetic *conſiſts in aſſuming the* Cauſes *diſcover'd, eſtabliſh'd, as* Principles; *and by* Them, *explaining the* Phœ-*mina proceeding from* Them, *and proving the* Explanations.

Of FLUXIONS.

THE Method *of* FLUXIONS, *is the* Arithmetick, *or* Analyſis, *of* infinitely *ſmall, variable* Quantities; *The* Method *of finding an* Infiniteſimal, *or* Infinitely *ſmall* Quantity, *which being taken an* infinite *Number of* Times, *becomes* *equal to a given* Quantity.

SIR Iſaac Newton *calls theſe* infinitely ſmall Quantities, FLUXIONS; *as conſidering them as the momentary* Incre-*ments, or* Decrements, *of variable* Quantities, e. gr. *Of a* *Line, conſider'd, as generated by the* Flux *of a* Point; *or, of a* *Space generated by the* Flux *of a* Line.

THE Inverſe *Method of* FLUXIONS, *conſiſts in finding* *the* Magnitudes, *from the* infinitely *ſmall Parts thereof* *it compounds and ſums up what the other has* reſolved: *But what that has* decompounded, *this does not always* re-eſtabliſh; *ſo that the* Inverſe Method *is* limited *and* imperfect, *at leaſt hitherto. If it were once* Compleat, Geometry *would be* *arriv'd at its laſt* Perfection.

IN *the* Direct Method, *the* Infinitely *ſmall Quantities of* *the* Ordinate *and* Abſciſs, *give the* Subtangent requir'd. *In the other it* gives the ſmall Quantities of the Abſciſs and Ordinate *which* *compos'd it, and of* Conſequence, *the* Abſciſs *and* Ordinate *themſelves.*

themselves But *the* distinguishing Province *of this* Method is
in Measuring *the* Base *of a* Parallelogram, *multiplied by the*
infinitely small Element *of its* Heighth, *gives an* infinite *small*
▭ ; *which is the* Element *of the* finite ▭ ; *and is repeated an*
Infinity *of Times therein.* When *we have to do with* Surfaces,
terminated by Curves, *this* Method *is necessary,* or, *at least,*
Superior *to any other.*

SUPPOSE, e. gr. *in a* Parabola, *the Space included*
between Two *infinitely near* Ordinates, *an infinitely small*
Portion *of the* Axis, *and* Arch *of the Curve* ; *it is certain, that*
infinitely small Surface *is no* Parallelogram ; *since the* Ordinates
are not equal, and the Arch *not Parallel to the* Axis ; *but in the*
strictest Geometry *may be consider'd as such* ; *by reason it is*
infinitely small, and the Error, *of consequence, infinitely little*
or none.

SO that to Measure it, there needs nothing but to multiply
an Ordinate *of the* Parabola, *by the infinitely small Portion of*
the Axis *corresponding thereto.* Thus *we have the* Element *of*
the Whole Parabola, *which* Element *being rais'd by the Inverse*
Method, *to a finite* Magnitude, *is the* Whole Surface *of*
the Parabola.

THIS Advantage is peculiar to the Geometry *of Infinites,*
which, being able, without any Error, *to treat little* Arches *of*
Curves, *as if they were* Right-Lines ; Curvilinear Spaces, *as*
if Rectilinear Ones, &c. *enables it not only to go with more* Ease
and Readiness, *than the* Antient Geometry, *to the same*
Truths ; *but also the greater Number of Truths, inaccessible*
to the other.

ITS Operations. *in Effect, are more easie, and its*
Discoveries *more Extensive : And* Simplicity, *and* Universality,
are its distinguishing Characters:
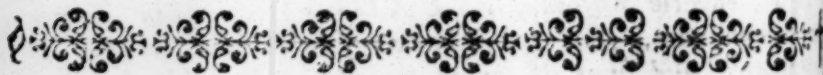
All Persons who are pleased to be CONTRIBUTORS
by Answering the ÆNIGMA'S, QUESTIONS &c. in this
DIARY ; or by sending New Ænigma's, Questions, Paradoxes,
or other Subjects fitting for this WORK, are desired to send
their Solutions with them, before the End of *May,* 1744. Di-
rected for the Author, at Mr. Simpson's, at Stationers-Hall,
LONDON   [Post Paid]

New Moon,	the 3d day, at 8 at Night
First Quarter,	the 11th day, at 7 at Night
Full Moon,	the 18th day, at 11 Morning
Last Quarter,	the 25th day, at 11 Morning.

A	Circumcision. NEW-YEAR's-DAY.	6 M	4
M	Sun appeareth 4 min. af. 8, is hid 56 min. aft. 3	7	36
T	Day increased half an hour	☾	sets
W	Good Movements should be 10 m. faster than Sun.	4 A	25
T	Sun rises at 8, sets at 4. Day 8 ho. long	5	37
F	Epiphany. CHRIST's Star appears to Gentiles	6	5
S	Watch and Clock 11 m. faster than Sun-dial	8	3
A	1 Sunday after Epiphany	9	15
M	Day break 3 q. after 5. Twil. ends 1 q. after 6	10	28
T	⎨ According to Equation of Natural Days, good	11	43
W	⎬ Pendulums should be 12 min. faster than Sun.	Morn	
T	Planetary hour by day 42 min by Night 78	1	1
F	Hilary, B. **Marriage comes in.**	2	26
S	**Oxford** Hilary, and **Cambridge** Lent Term beg.	3	54
A	2 Sunday after Epiphany	5	21
M	Sun rises 3 quar. after 7, sets 1 quar. after 4	6	36
T	Sun due East. at 5 morning	☾	rises
W	Day increased 1 hour, 18 minutes	4A	17
T	Watches 13 min. 48 seconds too slow.	5	51
F	Prince of WALES Born. Octab. Hil. 1 Ret.	7	21
S	Day break 30 min. after 5	8	47
A	3 Sunday after Epiphany. Septuagesima	10	6
M	Hilary Term begins. **Marriage goes out.**	11	24
T	Sun rises 30 min. after 7, sets 30 m. after 4	Morn.	
W	Conversion of Saint PAUL	0	42
T	Daylight goes down 35 m. after 6 in the Evening	2	0
F	Quind. Hil. 2 Ret. Watches 14 m. 3 q. too fast	3	16
S	Day increased 1 hour, 15 minutes	4	25
A	Sexagesima.	5	26
M	K. CHARLES I. Martyr'd, at Whitehall ⎫	6	13
T	[at 12 minutes past One, in 1648-9. ⎭	6	56

An Account of what *Weather* happened last YEAR, from *June*, 1742, to *June*, 1743.

In *January* 1743. Rainy, 1, 2, 3, 5, 8, 19, 20, 25, 26 ... 9, 10, 17, 18, 20, 21. 27. 30.   Windy, 1, 2, 3 ... 15, 24, 25, 26, 28, 29, 30, 31, Stormy, 27. Barom ... 2. 29, 0. 29, 6. 30, 2. 29, 8. 29, 7. 29, 0.

New Moon, the 2d day, at 3 in the Afternoon
First Quarter, the 10th day, at 7 in the Morning.
Full Moon, the 16th day, at 9 at Night
Last Quarter, the 24th day, at 5 in the Morning.

M. D's.	W. D's.	Sundays, Holy-Days, Remarkable Days, Eclipses, Sun-rising, and Sun-setting, Length of Days and Nights, Regulation of Clocks, Terms, Returns, Day-break, Twilight, Planetary Hours, &c.	Moon's Rising from the Change, and Setting from the New to the Full.
1	W	*Sun rises* 1 qu. after 7, sets 3 qu. after 4.	7 M
2	T	Purification, or, Candlemas Day	☾ sen
3	F	Craft. Purif. 3 Ret. *Watch* 14 m 39 *sec. too fast*	5 A
4	S	Day break 9 m. after 5. Daylight ends 6, 51	7
5	A	Quinquagesima, or, Shrove Sunday. Esto mihi.	8
6	M	*Watches* 14 *min. half too fast.*	9
7	T	Shrove Tuesday. **Camb.** Com. for B. **A.** 8th.	10
8	W	Ash Wednesday, the first Day of Lent. Dies Cin.	Morn
9	T	Octab. Purif. 4 Ret. *Sun* rises at 7, sets at 5	0
10	F	Day 10 hours long. Night 14 hours.	1
11	S	*Watches* 14 *min too fast*	3
12	A	1 Sunday in Lent. Quadragesima. Invocavit	4
13	M	Term Ends.	5
14	T	Ember Week. *Valentine.*	6
15	W	Day increas'd 3 hours since 12th of *December.*	6
16	T	Sun rises 3 q. after 6, sets 1 q after 5	☾ ni
17	F	Day 10 ho. half long. Night 13 ho. and half	6 A
18	S	*Watches* 12 *min. half too fast*	7
19	A	2 Sunday in Lent. Reminiscere.	8
20	M	Day 10 ho. 39 min. long. Night 13 ho. 15 m.	10
21	T	*Watches* 12 *min. too fast.*	11
22	W	Princess of HESSE Born	Morn
23	T	*Planetary ho by Day* 54 *min by Night* 66	1
24	F	St. Matthias, Apostle. Day 11 hours long	2
25	S	Day breaks 26 min. after 4. Twil. ends 7. 34	3
26	G	3 Sunday in Lent. Oculi mei semper ad Dom.	4
27	M	Day 11 hours, 14 min. long	4
28	T	*Watches* 10 *min.* 38 *sec. too fast*	5
29	W	*Sun* rises 19 min. after 6, sets 41 after 5	5

Weather in *February*, 1743.

Frosty, 6, 13, 17, 18, 19, 20, 21, 23   Snow, 7.
7, 8, 10, 12, 22, 23, 27, 28.   Windy, 3, 4, 5,
Warm 11. Barom Height, 29, 5. 29, 7. 29, 8. 29,

New Moon, the 3d day, at 8 in the Morning
First Quarter, the 10th day, at 3 Afternoon
Full Moon, the 17th day, at 8 in the Morning
Laſt Quarter, the 24th day, at Midnight

T	St. *David*, Arch-Biſhop of *Mienvia*, 584.	6	4
F	*C bad.* Sun riſes 10 m. after 6, ſets 45 after 5	☾	ſets
S	Day 11 ho. half long. Night 12 and half	6	A 8
G	4 Sun. or Midlent-Sunday. Lætare cum Jeruſal.	7	25
M	*Watch and Pendul. 9 min. too faſt*	8	43
T	*Planetary, or Jewiſh Hour 59 minutes*	10	3
W	Day breaks 45 min. after 4. Increaſ'd 4 ho. 28 m	12	27
T	*Cyprian.* 𝕮𝖆𝖒𝖇𝖗𝖎𝖉𝖌𝖊 Latter Act.	Morn.	
F	Sun in *Aries* 11 h 54 m. morn. Sun riſe and ſet 6	0	53
S	Equal Day and Night in all the Habitable World	2	13
G	5 Sunday in Lent. Judica.	3	23
M	*Watch and Clock 7 min before good Sun-dials*	4	11
T	Day breaks 48 m. after 3. Twil. ends 12 m. aft 8	4	45
W	Prince EDWARD Born	5	9
T	*Watch and Clock ſhould be 6 min faſter than Sun*	5	27
F	Sun riſes 45 min after 5, ſets 15 m after 6	5	42
S	St. *Patrick*, 𝕺𝖝𝖋𝖔𝖗𝖉 and 𝕮𝖆𝖒𝖇𝖗𝖎𝖉𝖌𝖊 Term End.	☾	riſes
G	6 Sunday in Lent. Palm Sunday. Dom. Magna	8	A
M	*Watch 4 min. 3 quarters too faſt*	9	29
T	*Cuthbert. Planetary hour by day 1 h. 14 m.* Eng.	10	50
W	Day breaks 25 min. after 3.	Morn.	
T	*Watches 2 min. too faſt*	0	8
F	Good-Friday. Our SAVIOUR's Crucifixion	1	17
S	Sun riſes half ho. after 5, ſets half hour after 6	2	21
G	Eaſter-Day. Our Saviour's Reſur. Lady-Day	3	3
M	Length of Days, 13 hours 18 minutes	3	50
T	*Watch 2 min. too faſt*	4	1
W	Day br. 3 h. 9 m. Twil. ends at 8 ho. 51 m.	4	18
T	Len. of Ni, 10 ho. 42 min. Day inc. 5 h. 54 m.	4	33
F	*Watch 1 m 1 q. too faſt.* Sun Eaſt *at 6 h. 25 m.*	4	46
S	Sun riſes 15 m. after 5, ſets 45 after 6	5	0

Weather in *March*, 1743.
An Extream cold Seaſon. Froſty, 2, 7, 8, 9, 11, 13, 14
20, 21, 23, 24, 25, 30. Snow, 7, 10, 12, 22, 25
indy, 11, 25, 26, 27, 28, 29, 31: Hail, 13, 14, 27
29. Barometer, 20, 6. 29, 0. 29, 4. 28, 9. 29, 2.

New Moon, the 1st day, at 10 at Night
First Quarter, the 8th day, at 9 at Night
Full Moon, the 15th day, at 9 at Night
Last Quarter, the 23d day, at 6 Afternoon.

1	G	Sunday after Easter. Low Sunday. Quasimodo	Aftern.
2	M	**Marriage comes in.** Day 13 h 3 q. long.	7 5
3	T	*Sun rises 9 min after 5, sets 51 min. after 6.*	9 2
4	W	**Oxford** and **Cambridge** Easter Term Begins.	10 47
5	T	Day br. 47 min. aft 2. Increas'd 6 ho. 18 min.	Morn.
6	F	*Now by Equation of Time good Pendulums shou'd* }	0 9
7	S	*keep Time exactly with* ☉, *his Motion swifter* }	1 25
8	G	2 Sunday after Easter. Misericordia.	2 1
9	M	Quind. Pasch. 1 Ret. *Sun rises at 5, sets at 7*	2 56
10	T	*Since 6th, Watch and Clocks lost 1 m half of Sun*	3 22
11	W	Easter Term Begins. Day br. at 2 ho. 29 m.	3 42
12	T	Day Increas'd 7 hours	3 55
13	F	*Sun due East at 14 m. after 6 morning*	4 8
14	S	*Sun rises 45 m. after 4, sets 45 after 7.*	4 22
15	G	3 Sund. aft. Easter. Jubilate. ☾ Eclips'd Visible	☾ rises
16	M	Tres Pasch. 2 Returns. ⌈Prince *William* Born.	8 A 35
17	T	Day 14 ho. 32 m. long. Night 9 ho. 28 mi:	9 54
18	W	Day break at 2 a-Clock.	11
19	T	*Watch and Clock 3 min. behind Sun-dials.*	Morn.
20	F	Twilight ends 45 m. aft 10 Day inc. 7 h. 28 m	0 13
21	S	*Planetary, unequal, or Jerusalem hour, 1 h. 14 m*	1 9
22	G	4 Sunday after Easter. Cantate.	1 46
23	M	Mens. Pasch. 3 Ret. St. *George.*	2 11
24	T	**Westminster Election.** Sun rises 30 m. aft. 4.	2 30
25	W	St. *MARK*, Evangelist. Sun sets 30 m. aft, 7	2 45
26	T	Length of Day 15 hours. Night 9 hours.	3 6
27	F	Day break 15 min. after one a-clock	3 10
28	S	*Watch and Clock 4 min. too flow.*	3 20
29	G	Rogation Sunday. 5 S. aft. Easter. Jucunditatis	3 21
30	M	Quind. Pasch. 4 Returns. **Marriage goes out.**	3 40
		Length of Day 15 ho. 20 m. Night 8 h. 40 m	

New Moon, the 1ft day, at 9 in the Morning
Firſt Quarter, the 8th day, at 4 in the Morning
Full Moon, the 15th day, at 9 in the Morning
Laſt Quarter, the 23d day, at 11 in the Morning
New Moon, the 30th day, at 5 in the Afternoon.

			Aftern.
T	St. Philip and Jacob.	*Watches 4 min. too ſlow*	Aftern.
W	Rogation Days.		9 57
T	Holy Thurſday, CHRIST's Aſcenſion. Fœlix.		11 16
F	Craſt. Aſcen. 5 Ret. Day 11 ho. half long		Morn.
S	Day break 40 min. after Midnight.		0 17
G	Sunday after Aſcenſion. Exaudi.		1 1
M	Term Ends. *Watch 4 min. 10 ſec. too ſlow*		1 30
T	Day Increaſed 8 hours and half		1 51
W	*Plan ho by day, 1 h. 19 m* *Sun Eaſt 7 h. 6 m.*		2 6
T	**Oxford** and **Cambridge** Term Ends		2 18
F	*Watches 4 min. too ſlow*		2 30
S	*No real Night, but all Twilight 'till 14th of July.*		2 42
G	Whit-Sunday, or, The Deſcent of the Holy Ghoſt		2 55
M	*Sun riſes at 4, ſets at 8.* Day 16 ho. Night 8 h		3 10
T	Day Increas'd 8 hours, 3 quarters.		☾ riſes
W	Ember Week. Day 16 ho. 6 min.		10 A 0
T			10 . 57
F	*Sun riſes 5 min. before 4, ſets 5 min. after 8*		11 40
S	*Dunſtar. Watches 3 min. too ſlow*		Morn.
G	Trinity Sunday. **Marriage comes in.**		0 11
M	Craſt. Trin. 1 Ret **Trin. Coll. Oxon.** Elect		0 34
T	*Sun riſes 51 m after 3, ſets 9 min. after 8.*		0 51
W	**Oxford** Term Begins. Day 16 ho. 20 min		1 4
T	Prince *George* Born. Corpus CHRISTI.		1 15
F	Trinity Term Begins.		1 25
S	*Auguſtine.*		1 35
G	1 Sunday after Trinity.		1 46
M	Octab. Trin. 2 Returns.		2 3
T	King CHARLES's Reſtauration 1660		2 24
W	Princeſſes *Amelia,* and *Caroline* Born.		☾ ſets
T	Day 16 ho. half long. Night 7 ho and half		10 A 2

Weather in *May,* 1743.

dry, backward Seaſon. Rainy, from the 20th. to the 24th,
from the 26th to the End. Hot, 6. 7, 8, 9, 10, 14, 17.
meter, 29, 7.   29, 9.   33, 0.   29, 6.   29, 5, 29, 2.

First Quarter, the 6th day, at 9 in the Morning
Full Moon, the 13th day, at 11 at Night
Last Quarter, the 22d day, at 2 in the Morning
New Moon, the 28th day, at Midnight.

1	F	Sun rises 47 m. after 3, sets 17 m. after 8	10 A 59
2	S	Day 16 hours, 34 min. long	11 29
3	G	2 Sunday after Trinity	11 5
4	M	Quind. Trinitatis, 3 Returns	Morn
5	T	Sun rises 43 m. after 3, sets 17 after 8	0 10
6	W	*Now good Clocks, &c go equal with the Sun*	0 24
7	T	Sun rises about the 5th part of a minute earlier.	☉ 35
8	F	The Sun is so slow now, your Watches gain 1 mi.	0 4
9	S	Day increas'd 9 ho. 12 m. Sun rises 42 m. aft. 3.	0 5
10	G	3 Sunday after Trinity	1 13
11	M	K. GEORGE II. Inaug. S. Barnabas. *Tres Trin.*	1 33
12	T	*The Planetary hours by day, are now 83 m. long*	2 0
13	W	Term Ends. Sun due *East* 18 min. aft. 7 morn	☾ rises
14	T	*Watches have gain'd 2 min. of Sun in 9 days.*	9 A 33
15	F	King GEORGE II. Proclaimed.	10 7
16	S	Day 16 ho. 34 m. long. Night 7 ho. 26 min.	10 3
17	G	4 Sunday after Trinity	10 5
18	M	Sun rises 44 min. after 3, sets 16 min. after 8	11 0
19	T	Day shortned 4 minutes	11 1
20	W	*Watches too fast 3 minutes.*	11 27
21	T	Sun rises 45 min. after 3, sets 15 after 8	11 37
22	F	Day 16 ho. and half long. Night 7 ho. and half	11 45
23	S	Day decreased 10 min.	Morn
24	G	5 Sunday after Trinity. St. JOHN, Baptist.	0 1
25	M	St. John's College Oxon. Election.	0 10
26	T	*Watches and good Pendulums 4 min. before Sun*	0 44
27	W	Sun rises 39 m. after 3, sets 11 min after 8	1 22
28	T	*Watches 4 min. 20 sec. too fast for the Sun.*	2 1
29	F	St. PETER, and St. PAUL.	☾ sets
30	S	Oxford Act Begins. Exeter Coll. Election	9 A 5

Sun in *Cancer*, 10 days, at 1 ho. 54 min. P. M.

Weather in *June*, 1743.

Rainy, 3, 4, 5, 6, 11, 12, 13, 14, 18, 30. Windy,
22, 24, 27. Hot, 7, 8, 11, 14, 27, 28, 29. Sultry,
6, 9, 10, 20, 21, 23. Barometer, 29, 5. 29, 8. 29,
29, 3. 29, 6. 29, 7. 29, 6. 29, 5. 29, 6. 29, 7.

First Quarter, the 5th day, at 5 in the Afternoon
Full Moon, the 13th day, at 2 in the Afternoon.
Last Quarter, the 21st day, at 3 in the Afternoon
New Moon, the 28th day, at 7 in the Morning.

10 A 59	G	6 Sunday after Trinity.	10 A	8
11 29	2 M	*Sun rises* 54 min. aft. 3, sets 6 min. after 8	10	24
11 5	3 T	**Cambridge** Com. Day 16 ho. 12 min. long	10	36
Morn	4 W	*Planetary hour by Day* 80 min.	10	47
0 10	5 T	Day decr. half an ho. *Watch too fast 5 min. 1 q.*	11	0
0 14	6 F	Day 16 hours long. Night 8 hours	11	13
0 35	7 S	*Thomas* à *Becket.* Sun rises at 4, sets at 8	11	32
0 4	8 G	7 Sunday after Trinity	11	57
0 5	9 M	**Oxford Act,** seven Days before Term Ends	Morn	
1 13	10 T	*Sun due East* 7 min. after 7 in morning	0	29
1 33	11 W	*Sun* rises 5 m. after 4, sets 5 min. before 8	1	11
2 0	12 T	Day 15 hours, 3 quar. long	2	8
☾ rises	13 F	*Now there begins to be some Night again. Sun* ⎱	☾ rises	
9 A 33	14 S	*at Midni. being above* 18 D.g. *below Horizon* ⎰	8 A	54
10 7	15 G	8 Sunday after Trinity.	9	9
10 3	16 M	Day break 25 min. aft. midnight.	9	21
10 5	17 T	Day increas'd 1 hour. *Watch 5 m. 3 q. too fast*	9	32
11	18 W	*Sun* rises 1 q. after 4, sets 3 q after 7	9	43
11 1	19 T	Dog-Days Begin. *Syrius* rises with the *Sun*	9	53
11 1	20 F	Day break at 1 a clock. Twilight ends at 11.	10	5
11 3	21 S	*Planetary hour by day,* 1 ho. 16 min. *Astronomic.*	10	19
11 43	22 G	9 Sunday after Trinity	11	40
Morn	23 M	Day dec. 1 ho. 18 mi. *Wat. 5 m. half too fast*	11	9
0 1	24 T	**Magdalen College Oxon. Election.**	11	54
0 15	25 W	St. JAMES, Apostle.	Morn,	
0 44	26 T	Day br. half ho. aft. 1. Twi. end ha. h. aft. 10	1	0
1 20	27 F	Day shortned 1 ho. 36 min.	2	25
2 1	28 S	*Sun* rises half ho. aft. 4, sets half ho. aft. 7	☾ sets	
☾ sets	29 G	10 Sunday after Trinity. Day 15 ho. long	8 A	28
9 A 5	30 M	*Wat. Clo. & good Pendulums* 4 m. 3 q. before Sun	8	48
	31 T	Princess *AUGUSTA* Born.	8	56

Weather in *July,* 1742.

Rainy, 1, 2, 3, 4, 6, 7, 9, 11, 12, and from the 15th. to the
18th. Windy, 11, 13, 14, 18, 19, 20, 23, 24, 25, 26, 28
hot, 19, 20, 28, 31.   Barom. 29, 3.   29, 5.   29, 6
9, 4. 29, 6. 29, 2   29, 5.   29, 3.   29, 8.

First Quarter, the 4th day, at 3 in the Morning
Full Moon, the 12th day, at 6 in the Morning
Last Quarter, the 20th day, at 1 in the Morning
New Moon, the 26th day, at 3 in the Afternoon.

1	W	*Lammas Day.*	9	A 8
2	T	*Good Pend Wat. and Clo.* 4 *min. half too fast*	9	23
3	F	Day breaks 10 min. after 2 a-Clock	9	39
4	S	*Sun rises* 45 min. after 4, sets 45 after 7	10	1
5	G	11 Sunday after Trinity.	10	33
6	M	Day 14 ho half long. Night 9 ho. and half	11	10
7	T	Day decreased 2 ho. and a quarter	Morn	
8	W	*Watch, Clock and Sun-dials won't go alike ; if*	0	2
9	T	*Movements be good, will be 3 min. before Sun.*	1	6
10	F	*Planetary ho. by day 1 ho.* 11 *min. Night* 49 *m*	2	18
11	S	Day break 30 m. after 2. Twil. ends 20 aft. 9	3	32
12	G	12 Sunday after Trinity.	(	rises
13	M	*Sun rises at* 5, *sets at* 7. Day 14 h. lo. Night 10	7	A 45
14	T	*Sun due East* 35 min. after 6 morn.	7	56
15	W	Day decreased 2 ho. 50 min.	8	6
16	T	Day break 47 min after 2, ends 13 m. aft. 9	8	17
17	F	*Sun rises* 18 min. after 5, sets 52 after 6	8	30
18	S	Day 13 ho. 40 m. long Night 10 ho. 20 m.	8	45
19	G	13 Sunday after Trinity.	9	13
20	M	*Now Watch and Clock should keep Time with Sun*	9	50
21	T	*Sun rises* 45 min. after 5, sets 45 after 6	10	44
22	W	Day 13 ho. 30 min. long. Night 10 ho. 30 m.	11	59
23	T	*Now Watch and Clock will lose* 1 *min. of Sun*	Morn	
24	F	St. BARTHOLOMEW, Apostle.	1	2
25	S	Day break 13 min. aft. 3. Twil. at 47 m. aft. 8	3	3
26	G	14 Sunday after Trinity	(	sets
27	M	Dog Days End. Canis Major *rises at* 3 *Morn.*	7	A 8
28	T	*Sun rises* half an ho. after 5, sets half ho. aft. 6	7	20
29	W	Day 13 ho. long. Night 11 hours.	7	35
30	T	*The Crepusculum or Twilight ending, is, when the*	7	5
31	F	*Sun is got full* 18 *Degrees below the Horizon*	8	10

Weather in *August*, 1742 Rainy, 16. Windy, 1, 2,
4, 15, 16, 17, 19, 21, 22, 25, 27, 28. 29, 31. Hot, 2, 4,
6. 14, 15, 16, 21, 24, 27, 31. Frost, 30, 31, at Night
Barometer, 29, 9. 30, 0. 29, 9. 30, 0. 29, 8. 29, 6
29, 7. 29, 6. 29. 8.

First Quarter, the 2d day, at 5 in the Afternoon
Full Moon, the 10th day, at 10 at Night
Last Quarter, the 18th day, at 9 in the Morning
New Moon, the 25th day, at 1 in the Morning.

1	S	*Watches and Clocks* 3 m. 35 *sec. slower than Sun*	8 A	30
2	G	15 Sunday after Trin.	9	14
3	M	Day 12 ho. 30 min. long. Night 11 30 min.	10	3
4	T	*Sun rises* 3 q. aft. 5, sets 1 quar. after 6	11	2
5	W	*Watches 5 min. and half too slow*	Morn.	
6	T	Day breaks 47 m. aft. 3. Day-light ends 13 aft. 8	0	14
7	F	Day decreased 4 ho. 18 minutes	1	2
8	S	*Sun rises* 53 min. after 5, sets 7 min. after 6	2	41
9	G	16 Sunday after Trinity. Day 10 h. 12 m. long	3	53
10	M	*Watches and Clocks should be 7 min. after the Sun*	☾ rises	
11	T	*Planetary Hours now equal to the common Hours*	6 A	24
12	W	*Sun rises, and sets at 6. Equal Day and Night*	6	35
13	T	*in all the Habitable World, being just 12 ho.*	6	48
14	F	Holy-Rood-Day. *Watches 8 min. 1 qu. too slow.*	7	4
15	S	Ember-Week. Day breaks 7 min. after 4	7	23
16	G	17 Sunday after Trinity. Day decreas'd 5 ho.	7	50
17	M	Day breaks 8 min. after 4	8	45
18	T	*Watches and Clocks are now 10 min. after the Sun*	9	49
19	W	Sun rises 1 q. after 6, sets 1 qu. after 5	11	13
20	T	Day 11 hours and half long	Morn.	
21	F	St. MATTHEW, Apostle and Evangelist.	0	42
22	S	*Pendul. & Clocks should be 11 m slower than Sun*	2	17
23	G	18 Sunday after Trinity	3	45
24	M	*Plan. Hour by day 56 mi. Sun East 48 m. aft. 5*	☾ sets	
25	T	*Watches 12 minutes too slow*	5 A	48
26	W	Sun rises 30 min. after 6, sets 30 mi. after 5	6	2
27	T	Day 11 hours long. Night 13 hours	6	21
28	F	Day br. 34 m. aft. 4. Twil. ends 26 m. aft. 7	6	45
29	S	St. MICHAEL, the Arch-Angel	7	18
30	G	19 Sunday after Trinity. Sun rises 37 m. aft. 6	8	2

Sun enters *Libra* 12th Day, at 5 h. 33 m P. M

Weather in *September*, 1742.

Windy Days, 1, 2, 3, 4, 5, 8, 9, 10, 12, 13, 15, 29, 30.
Rain, 4, 5, 6, 13, 14, 26, 28, 29. The rest Temperate, but a
dry Season. Barom. 29, 6. 29, 5. 29, 7. 29, 5. 29, 6.
29, 9. 29, 8. 29, 7. 29, 6.

First Quarter, the 2d day, at 11 in the Morning
Full Moon, the 10th day, at 1 Afternoon
Last Quarter, the 17th day, at 4 Afternoon
New Moon, the 24th day, at 1 in the Afternoon.

1	M	*Watch and Clock* 13 *min.* 1 *q. flower than Sun.*	8	A
2	T	Day break 42 min. after 4 Twil. ends 7. 18.	10	
3	W	*Sun rifes* 3 q. aft. 6. fets 1 q. after 5	11	
4	T	Day 10 ho. half long. Night 13 and half	Morn.	
5	F	*Good Pendul. will be* 14 *min flower than Sun*	0	
6	S	Day decreas'd 5 hours 57 min.	1	
7	G	20 Sunday after Trinity	2	
8	M	*Sun rifes* 54 min. after 6, fets 6 min. after 5.	4	
9	T	St. *Dionyfius.* *Watch* 15 *min. too flow.*	5	
10	W	𝕺𝖗𝖋𝖔𝖗𝖉 and 𝕮𝖆𝖒𝖇𝖗𝖎𝖉𝖌𝖊 Term Begins		
11	T	King GEORGE II. Crown'd.		
12	F	Day break 5 min. after 5 in the morning	5	
13	S	Day shortned 6 ho. 44 min.	6	
14	G	21 Sunday after Trinity	6	
15	M	*Sun rifes* 8 min. after 7, fets 52 after 4.	7	
16	T	Day shortned 6 h. 54 min. *Planetary hour* 48 m	9	
17	W	*Sun precifely Eaß* 10 m. after 5 morn	10	
18	T	St. Luke, Evangelift. Day 9 ho. half long	12	
19	F	*Sun rifes* 1 q. after 7, fets 3 q. after. 4	Morn	
20	S	Tref. Mich. 1 Return	1	
21	G	22 Sunday after Trinity.	2	
22	M	Princefs of ORANGE Born.	4	
23	T	Michaelmas Term Begins.	5	
24	W	The old unequal *Jewiß* or *Plan.* hour, 45 m lo.		
25	T	*Crifpin.* Day break 26 min. after 5	4	A
26	F		5	
27	S	*Sun rifes* 30 m. after 7, fets 30 m. after 4.	5	
28	G	23 Sunday after Trinity. St. Simon and Jude.	6	
29	M	Day 9 ho. long. Night 15 hours	7	
30	T	King GEORGE II. Born 1683.	9	
31	W	*Sun rifes* 37 m. after 7, fets 23 after 4.	10	

Weather in *October*, 1742.   Windy, 3, 5, 8. 9, 10,
24, 25, 29, 21.   Stormy, and high Wind, 2, 3.   Rainy,
to the 8th. and on 17, 18, 23, 26, 28, 30.   Froft
28, 29.   Snow 28.   Warm, 11, 12, 13, 14,
Barom. 29, 3.   29, 1.   28, 8.   29, 5   29, 7.   29, 6.

First Quarter, the 1st day, at 7 in the Morning
Full Moon, the 9th day, at 3 in the Morning
Last Quarter, the 15th day, at Midnight
New Moon, the 23d day, at 4 in the Morning.

T	All Saints. Day 8 hours 42 minutes long.	11 A53
F	All Souls. *Watch* 15 *mi.* 1 *q. too flow*	Morn.
S	Craft. Anim. 3 Ret. **All-Souls Coll.** Election	0 45
G	24 Sunday after Trinity. Sun rifes 45 mi. aft. 7	1 53
M	Gun-Powder PLOT, 1605.	3 5
T	Day 8 ho. 26 min. long. Night 15 ho. 34 min.	4 18
W	Day break 42 min. after 5. Twil. end 18 af 6.	3 34
T	*Watch and Clock will be* 14 min. *flower than Sun*	6 58
F	Sun rifes 52 min. after 7, fets 8 min. after 4	☾ rifes
S		10 A42
G	25 Sunday after Trinity. *Martin,* Bi of *Tours*	5 35
M	Craft. Mart. 4 Returns. *Watch* 13 *min. too flow*	6 47
T	Day decreafed 8 ho. 32 min.	8 12
W	Day breaks 49 min. after 5	9 42
T	Sun rifes at 8, fets at 4. Day 8 ho. Night 16 ho	11 10
F	*Jewifh* ho. by day, 40 min. by night 80 m.	Morn.
S	Sun due *Eaft* point, 51 min. after 4	0 35
G	26 Sunday after Trinity. *Watches* 11 *m too flow.*	1 59
M	Princefs of *WALES* Born. Octab. Mart. 5 Ret.	3 22
T	Day 7 hours 50 minutes long.	4 44
W	Day break 56 m. after 5. *Watch* 10 *m. too flow*	6 8
T	Day fhortned 8 ho 58 min.	7 30
F	Sun rifes 10 m. after 8, fets 50 after 3	☾ fets
S	Day 7 ho. 40 min. long. Night 16 ho. 20	4 A28
G	27 Sunday after Trinity. St. *Catherine.*	5 28
M	Quind. Mart. 6 Returns.	6 38
T	Day breaks at 6, and Twil. ends at 6	7 50
W	Term Ends.	9 2
T	**Baliol College** Election. Day 7 h. 30 m.	10 14
F	St. ANDREW, Apostle.	11 25
	Sun rifes 15 m. after 8, fets 45 after 3	

Wetaher in *November,* 1742.

Rain, 1, 2, 5, 6, 20, 26, 29. Windy, 1, 13, 16, 27,
20. Froft, 7, 9, 11, 12, 13, 14, 15, 28, 29. Snow.
14. Barometer 29, 7. 29, 1. 29, 0. 29, 2. 29, 4
3. 29, 5. 29, 1. 28, 9. 29, 0 29, 2. 29, 4.

First Quarter,   the 1ſt day,   at 5 in the Morning
Full Moon,   the 8th day,   at 4 in the Afternoon
Laſt Quarter,   the 15th day,   at 9 in the Morning
New Moon,   the 22d day,   at 8 at Night
Firſt Quarter,   the 31ſt day,   at 1 Morning.   [*T. Cowper*

1	S	*Sun* riſes 16 min. after 8, ſets 42 min. after 3	Morn
2	G	Advent Sunday. **Marriage goes out** 'til 13 *J.*	0
3	M	Day 7 ho. 28 min. long. Night 16 ho. 32 m.	1
4	T	Day break 3 m. after 6. *Watches 3 m. too ſlow*	3
5	W	Day now ſhortened 9 hours, and 10 minutes.	4
6	T	*Sun* riſes 18 m. aſt. 8, ſets 3, 42 Day 7 h. 24 n	5
7	F	Princeſs LOUISA Born.	7
8	S	*Watches 2 min.* 10 *ſeconds too ſlow*	(riſe
9	G	2 Sunday in Advent. *Sun* riſes 18 min. after 8	4 A
10	M	Shorteſt Day in *Warwickſhire*, 7 ho. 24 m. long	5
11	T	Greateſt Shortning of the Days is 9 ho. 12 m.	7
12	W	*Sun* riſes 18 min. after 8	8
13	T	*Now good Clocks, Watches, and Sun go together*	10
14	F	Ember Week	11
15	S	Day increas'd again 2 minutes	Morn
16	G	3 Sunday in Advent. *O Sapientia.*	0
17	M	**Oxford** and **Cambridge** Terms End.	2
18	T	*Good Pendulums gain 2 m. 1 q. of Sun in 5 days*	3
19	W	Day 7 h. and half long Night 16 h. and half	5
20	T	*Sun* riſes 1 quarter after 8, ſets 3 quar. after 3	6
21	F	St. THOMAS, Apoſtle.	7
22	S	Day Lengthened again 8 minutes	(ſet
23	G	4 Sunday in Advent. Day breaks at 6	4 A
24	M	*Watches 6 min. too faſt.*	5
25	T	CHRIST-MAS-DAY.	6
26	W	St. STEPHEN, Proto-Martyr.	7
27	T	St. JOHN, Evangeliſt.	8
28	F	Innocents; or, *Herod's* Murthering the Infants.	10
29	S	*Planetary hour 38 min* *Watches 8 min too faſt*	11
30	G	Sunday after Chriſtmas. Princeſs *Elizabeth* Bo.	Morn
31	M	*Sun* riſes 6 m. after 8, ſets 54 after 3.	0

Weather in *December*, 1742.

Freezing Days, 1, 8, 9, 10 11, 12, 13, 14, 15, 16,
23, 24.   Snow, 3, 7, 9.   Windy, and Stormy, 3, 7, 11,
16, 17, 29, 31.   Barom. 29, 8.   29, 7,   29, 9   29, 7

WITHIN the Sphere of the Earth's Orbit will happen four Eclipses this Year; twice will the Moon, in her wand'ring Course, interpose and hide the Splendor of the Sun from falling on the Earth, or its Atmosphere; and twice will the Earth in its anual elliptic Orbit, be so full in a Line between the Sun and Moon, as to hinder her from receiving the Light she borrows from the Sun, to enlighten the Earth by Reflection.

1. Sun eclipsed, 1 *April*, at 10 at Night invisible.

2. Moon eclipsed, 15 *April*, at half an hour after 8 at Night visible.

		Beg.		Mid.		End		Dig.	
		H	M	H	M	H	M		
From *Astr. Carol.* at *Coventry* ———		VII	4	VIII	28	IX	52	8	0
John Randles of *Wem.*	*London* ——	7	5	8	30	9	58	8	9
	Rome ——	7	57	9	22	10	50		
	Wemm ——	6	55	7	53	9	48		
William Leighton,	*London* ——	7	8	8	32	9	57		
	Arlington ——	7	15	8	39	10	4		
S. Bamfield, Leadbetter's Tables, London		7	3	8	16	9	29	6	53
Will. Brown, Brent's Comp. A.		7	3	8	29	9	55	8	1
Car. Cleobury ———		7	1	8	25	9	49	8	0
W. Honnor,	*Burchester* ———	6	54	8	23	9	52	8	23
	Rushden ———	6	58	8	27	9	56		
Mr. Ral. Hulse, London ——		7	8	8	28	9	56		
Tho. Cowper, Wellingborough ——		7	9	8	35	10	1	8	2
Mr. Poole, Hereford ——		7	8	8	30	9	50	7	50
Mr. Betts, Oxford ———		7	7	8	35	10	3	8	35

3. Sun eclipsed, 25 *September* invisible.

4. Moon eclipsed, 10 *October* invisible. Mr. *Hulse* has given the Calculation of this Eclipse at *Moscow*; The Beginning 11. 30. Middle 12. 46. End 1. 8.

ÆNIGMA LATINUM 1744. *Terpsichili Discipulus.*

FORMA licet procera mea est, similisque Cylindro,
    Non multum decoris sibi, nec deposcit honoris.
Pes unus, caput unum, crus, ac unus ocellus
Sunt mihi; verâ (oculus si non sit) laude tenebor.
Arrogo nunc partum ex longinquis partibus orbis,
Meque ferax mater nunc nostrâ fundit in orâ.
In me sunt artes multæ, variæque figuræ:
Multiplici pariter decoror, nitideque colore.
In facie est (si talem habeam) depicta venustas,
Quæ monstrat species hominum, formasque ferarum,
Vix domus ulla manet, quæ me non servat amicum,
Perque angusta juvo cunctos, et strata viarum

B   Usque

Ufque feni auxilior, juveni fum grata voluptas,
Subvenio **vetulæ**, me ambit male-fana puella.
Sed quamvis domino faveo, placeoque magiftræ,
Omnia crebro metu, et terrore animalia turbo.
Siquis habere fidem mihi vult, et caufa doloris
Ipfe fui multis, aliquos lethoque peremi,
Præfidiumque infirmis fum, tutamenque fidele,
Quo magis offendor, tanto magis æftuat ira ;
Debita fæpe fui tremor, et formido petenti,
Atque tuli domino gratam labente falutem.

Vos, pulchræ nymphæ, a dubiis defendo periclis,
Haud raro damnum cum fe fpatiantibus offert.
Dicite tum nomen ; quas res, quæ munera curo,
Et quum me vobis opus eft, fervire parabor.

ÆNIGMA, *per Lapwing.*

Erro terrarum latitans per orbem,
Pauperum parvas habito tabernas,
Et domos regum, mea pro virili
             Nomina celans.

Me petit vates, ut opem canenti
Præbeam : Legum petit & peritus,
Et mihi fidit, loculofque largis
             Impleo donis.

Cerberum per me domuit trifaucem
Fortis Alcides, Stygioque ab antro
Duxit exultans, humerifque latis
             Suftulit orbem.

Viribus pollens, Glyceræ *venuftam*
Detraho formam, fimul atque Amorphæ
Do venuftatem, rutilique centum
             Millia nummi.

Lubricam ætatem fupero parentum ;
Vivo poft mortem, affidueque vivam ;
Dum manet tellus, freta dum fecabunt
             Cærula nautæ.

Anfwers to the ÆNIGMAS in the laft Diary.

255. WOOL.   258. ANTS.
256. WIND.   259. A LOCK.
257. JACK at Bowls.   *Prize,* A PINCUSHEON.
                        Latin, GLOVES.

An Anfwer to all the ÆNIGMA's in the Diary 1743.　In the *Serge-makers Farewell to Taunton Dean.*　By Phil. Sprofon.

SINCE Times are grown fo very bad, and Trading is fo dull,　　　
　　And Money fcarcely to be had, I'll part with all my WOOL,　　1
Leave *Taunton Borough* to themfelves, and travel far away,
O'er boift'rous Waves, and rocky Shelves, toward the Weftern Ray.
But e'er I quit the Britifh State, a PINCUSH' will provide,　　*Prize*
Round as a JACK Bowl, trim and neat, and hang by Nancy's fide,　　3
A LOCK will put upon my Cheft, to keep my little Store,　　　5
A Dram to fet my Heart at reft, when ftormy WINDS do roar,　　2
Then hye for *Royal Betty*'s Land, where 'Bacco Weeds do grow,
To try if Fortune there may mend, and better Luck beftow;
Among th'Induftrious Planters where, like the fagacious ANT,
I may provide fufficient Store, againft the Time of Want.
But why (you'll fay) fhou'd I abroad, for Happinefs repair;
Will diftant Climes, or new Abode, difcharge the Mind from Care?
Yet let me try: if Fortune fmiles, or frowns, I'll be refign'd,
Enjoy the Good, and bear its Ills, with a fubmiffive Mind.

An Anfwer to all the ÆNIGMA's in the Diary 1743. in a Reflection on Wordly Felicity.　By Mr. W. Chapple.

　　What is this World! a Lump of crumbling *Earth*,
　　Whence *Men* as well as Brutes, derive their Birth:
　　Where we like ANTS muft grovel for a while,　　　　4
　　Deftin'd to anxious Cares and reftlefs Toil.
　　Here *Mifers*, in the Midft of Plenty, poor,
　　Their *Gold* LOCK up, and as their God adore:　　　5
　　Here One repines that *Fortune* proves unkind,
　　That *Jilt* which changes oft'ner than the WIND:　　2
　　And like a JACK difplac'd by ev'ry *Bowl*,　　　　3
　　Frets and perplexes his afpiring Soul:
　　Others, uneafy in a profp'rous State,
　　Would change their CUSHION for a WOOL-pack-feat;　　*Prize* 1
　　And having gain'd it, facrifice each Hour
　　To the Devotion of fome K——e in Power:
　　Others, who place their chief Delight in Show,
　　Wou'd imitate that *Butterfly* the *Beau*;
　　Who ftudious of his GLOVES and dangling *Cane*,　　*Lat.*
　　Admires himfelf, and does all elfe difdain:
　　Another, wounded with the *Fair One*'s Charms,
　　Is only happy in his Lover's Arms.

In fhort, we all with eager Hafte purfue
The imaginary Blifs we have in View ;
By various Paffions prompted, take our Turn
Upon this earthly Stage,——then drop into our Urn.

All the ÆNIGMA's anfwer'd by Auretta.

On my CUSHION I Pins have fo ftuck, that you'll find,
JACK-Bowls—and a LOCK, ANTS, GLOVES, WOOL, and WIND.

Coll. *Dagger's* Hint to *Jack Pudding*, in the Profecution of his hitherto difregarded Paffion.

Invellop'd with a golden Shower, like Jove thy Fair attend ;
Delia will then unLOCK her Door, and ftraight become thy Friend.
Laden like ANT or *Bee* approach, bring *Honey* to her *Hive* ;   4
Then mention but to her a *Coach*, fhe'll fafely lead or drive :
Ne'er ftuff her PIN-CUSHION with WOOL, erect drive boldly at her, Pr. 1
And offer her each time a Grull *, to ftrike 'twixt WIND and Water.   2
Step foftly to her if afleep, and fteal a Kifs at will :
Her GLOVES demand, and clofely keep, 'till JACK agrees with Jill.   L. 3

* Grull, *a certain Piece of current Coin among the Lilliputian Lovers.*

An Anfwer to the ÆNIGMA's by Mifs *Ch——bers.*

Have you not feen, a Bowling-Green,
   Where, on a Summer's Day,
A great Refort of Gentlemen, divert themfelves with Play ?
Swift as the WIND, the nimble JACK, fets out with Whoop and Hollow, 2. 3
He marks a Track, for all the Pack ; of heavy *Bowls* that follow.
Upon a Turf as fmooth as WOOL, the Combatants advance,   1
No Stick, no Stone, no Worm, nor ANT, impedes the pleafant Dance. 4
Sometimes a Pair of GLOVES is given, to him that haps to win :   Lat.
If Ladies only play the Game, the Prize a PIN-CUSHION.   Prize
This is the way that I have chofe, to anfwer every Riddle,
I have a KEY fits every LOCK, then what care I a fiddle ?   5

Anfwers to the ÆNIGMA's by Mr. *J. Stewart*, to the Author.

Sir,

Whether with GLOVES, with WOOL, or PIN, with WIND, or Bowls, or
   JACK   Lat. 1. Pr. 2, 3
To anfwer th'Enigma's, we begin, I think it matters not.
   A true Solution's all you want, then what avails which way ?
Now introduce the thrifty ANT, and now the LOCK and KEY.   4, 5
   How far this Rule will ftand the Teft, Dean *Bei——n* you furmife,
Give me but play among the reft, I then may get the Prize.

   In like manner they were all anfwered by Mr. *Bamfield*, *Mira*, *Anonymous*, *Buncielet*, Mr. *J. Clarke*, *Philomafus*, Mr. *Bowler*, Mr. *J. Green*, Mifs *Nanny Chifwell*, Mr. *Tho. Tarratt*, Mr. *J. Chefter*, Mr. *Ra. Hule*, Mr. *T. Ladds*, *Rufheus*, Mr. *D. Davis*, *Paffer Fido*, *Rufafortvortus*, Mr. *Rob. Hoare*, and moft of them by feveral others, as may be feen in the Catalogue at the End.   Anfwers

ANSWERS to the QUESTIONS in the last Year's Diary.

The 235 Question answered by *J. Turner.*

There is given $AC = CD = b = 97$ Inches, $AC = 13$, 8; $= CDB = 16$, $6 = d$ to find $CG = x$.

By 47. *e.* 1
$$\begin{cases} c^2 + 2cx + x^2, + y^2 = b^2 \\ d^2 + 2dy + y^2, + x^2 = b^2 \end{cases}$$
consequently they are equal to one another; or, $e^2 + 2cx = d^2 + 2dy$: and by the
1 Equat. $y = \sqrt{b^2 - c^2 - 2cx - x^2}$ which substituted for y, in $c^2 42cx - d^2 = 2dy$, is $c^2 + 2cx - d^2 = 2d\sqrt{b^2 - c^2 - 2cx - x^2}$; and squaring both sides of the Equation, makes $c4 + 4c3x - 2c^2d^2 + 4c^2x^2 - 4d^2cx + d4 = 4d^2b^2 - 4d^2c^2 - 8d^2cx - 4d^2x^2$; transp. $4c^2x^2 + 4d^2x^2 + 4c3x - 4d^2cx = 4d^2b^2 - 2d^2c^2 - c4 - d4$; and dividing all by the Coefficient of the highest Power, it will stand,

$$x^2 + \frac{c3x + d^2cx}{c^2 + d^2} = \frac{4d^2b^2 - 2d^2c^2 - c4 - d4}{4c^2 + 4d^2};$$

The Square compleated. and properly reduced gives this Theorem, $x = \sqrt{\frac{d \cdot b^2}{d^2 + c^2} \frac{d^2}{4}} - \frac{c}{2} = 58$, 2 GC; thence is found $y = 65$; $GA = 72$; $DG = 77$, 6; whence by common Trigonometry may be found the Angles $GAB = 42° 4' 30''$, $ABG = 47° 55' 30''$; and $CDG = 36° 52' 12''$. Now having the two Altitudes of the Sun found, and the Differences of Time given per Quest $= 76\frac{1}{5}$ Minutes, the Azimuth is easily had; then by the Theorem in p. 5. Lady's Diary 1742. (Answer to 220 Quest.) the Latitude will come out $52° 19' 37''$ and the Times of the Day, $8^h 0' 11''$. and $9^h 16' 23''$ the Answer required.
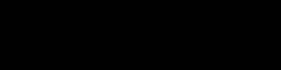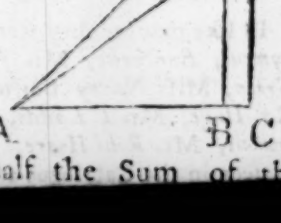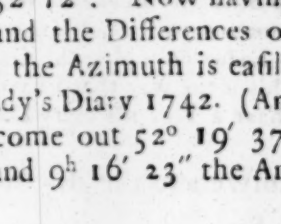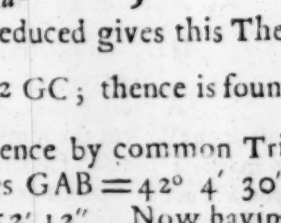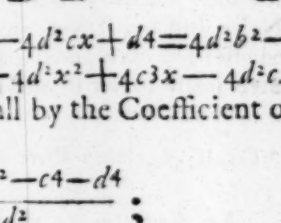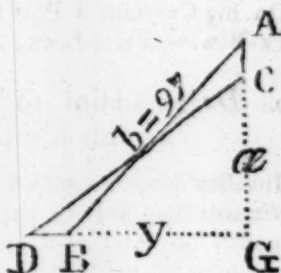
The same answer'd by Mr. *Betts.*
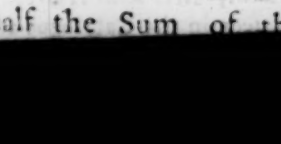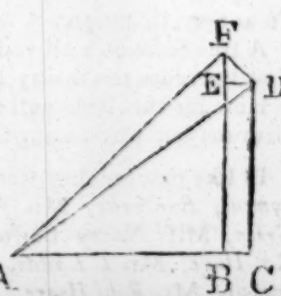
Put x and y, for the Sine and Cofine of the Angle EFD, Radius $= 1$. Then by Trigonometry. as, Sine $\angle$ EFD : ED :: Sine $\angle$ EDF : EF. i.e. $x : d :: y : c$; therefore $cx = dy$ and $\frac{x}{y} = \frac{d}{c} = $ Tangent of $42° 23' 51''$ the Angle EFD, or half the Sum of the Angles BAD and BAF = half the Sum of the

Rad. : DF. i. e. $y : c :: 1 : \dfrac{c}{y}$; and as A D : Radius ::

$\frac{1}{2}$ FD : Sine of half the Angle DAF; viz. $b : 1 :: \dfrac{c}{2y} : \dfrac{c}{2by}$;

or as, $2b : c :: \dfrac{1}{y} : \dfrac{c}{2by}$, viz. $2b : c ::$ Secant 42° 23′ 51″ :

Sine 5° 31′ 39″ equal to half the Angle DAF. which is half the Difference of the requir'd Altitudes; whence the Altitude CAF $= 47°$ 55′ 30″, and CAD $= 36° : 52′ : 12″$, and the times of the Day 8ʰ, and 9ʰ 16′; the Latitude 52° 19′ 37″ the Answer required.

This Question was answered by *Bironnos*, Mr. *S. Bamfield*, Mr. *J. Aſh*, Mr. *R. Sowerby*, Mr. *Ramſhay*, Mr. *Watts*, Mr. *Scyth*, Mr. *Tho. Cowper* the Propoſer, Mr. *W. Kingſtone*, and Mr. *Daniel*, in the former Method, and by Mr. *Dan. Howard* in the latter.

Queſtion 236. anſwered.

After the two Bodies have been 48 hours in motion, that of T is diſtant from the Point of Projection (B) 393270 miles, and makes an Angle with it of 59° 55′ Alſo L makes with A, an Angle of 98° 23′ and is diſtant from it 861570 Miles. Thro' the induſtrious Labours of ſome of our Correſpondents we have got an Anſwer to this abſtruſe and curious philoſophical Problem, but as it is doubted whether ſome Errors are not in it; and believing no one ſo equal to the Taſk, as the Author, whoſe Knowledge and Penetrability in ſuch difficult and uncommon Problems, is ſcarce to be rival'd in an Age; we have given only the Numbers above (beſides the Scheme and Anſwer we have inſerted in our 1ſt Vol. of Diary Queſtions, p. 193.) till ſuch time as the Propoſer favours us with his.

237. Queſtion anſwered by *Bironnos.*

Let LN repreſent the enlarged diff. Lat. between the Lizard and Jamaica. LS that between the Lizard and the Trade Wind. Then we have LS $= a = 1579.9$; TK $= 790,2 = b$; T$b = 720 = q$; JN $= 4246 = n$; let $y =$ TS; then $n - y = $ lK; and per Sim.

Triang. $a : y :: m : \dfrac{my}{a} = ta$;

$b : n-y :: q : \frac{q}{b} \times n-y = ib$; and *p.* 47. *e.* 1. $\sqrt{m^2 + \frac{m_2 y_2}{a}}$

$= Lt$; also, $\sqrt{q^2 + \frac{q^2 \times n-y^2}{b^2}} = Ti$; hence the required Mi-

nimum is $\frac{m}{6a} \sqrt{a^2 + y^2} + \frac{q}{9b} \sqrt{b^2 + n+y^2}$; which being

flux'd there comes out $qn - qy \times 2a \sqrt{a^2 + y^2} = mq \times 3b$

$\sqrt{b^2 + n-y^2}$; which solv'd, $y = 1857, 9215 = TS$. Hence
the Courfe from the Lizard to the Trade Wind is South 49°
37′ 25″. Wefterly Diftance = 1846.23 Miles; and thence to
Jamaica S. 71° 41′ 27″ W. Diftance 2291.95 Miles.

Anfwered by Mr. *J. Powle.* (Vid. 1 *Vol. Quest. p.* 198)

RS is the Parallel of 30° L the *Lizard*, J *Jamaica*, T the
Point where the Fleet muft come to in their Way, the Angle
TLS the firft Courfe fteer'd, &c. (*per Wright's* Projection) LS
= 1579,8979 Miles, which call *b*; SN = TK = 790,1607 = C; JN
= 4246 = *d*; Put $x = TS$; $m = 6$; $n = 9$ then (*per* 47. *e.* 1.)
$TL = \sqrt{bb + xx}$; $TI = \sqrt{cc + dd - 2dx + xx}$, and by a

uniform Velocity the Times of Defcript. will be $\frac{\sqrt{b^2 + x^2}}{m}$, and

$\sqrt{cc + dd + 2dx + xx}$; the Sum of which two muft be a
Minimum, being flux'd made = *o*, and order'd, there wil
arife this Equation: 1

$$\left.\begin{matrix} nn \\ -mm \end{matrix}\right\} x^4 \left.\begin{matrix} -2dn^2 \\ 2dm^2 \end{matrix}\right\} x^3 \left.\begin{matrix} ddnn \\ ccnn \\ -bbm^2 \\ -ddm^2 \end{matrix}\right\} x^2 + 2db^2 m^2 x = b^2 d^2 m^2.$$

In Numbers, $52x^4 - 441584x^3 + 771997102,9985x^2 +$
763080806290,03$x = 16200205 51753144$.

Solv'd, $x = 1458,016$; or $2891,56$; or $5488,45$, or $1346,03$;
but it is the firft of thefe Values (1458,016) which ferves our
prefent Purpofe. Now having found TS; by plain Trigono-
metry TL = 2149,86 is had (being the Diftance fail'd before the
Fleet's Arrival in the Trade Wind) and the Courfe fteer'd
SW*b*S 8° 27′ Wefterly: Thence to *Jamaica* TJ is 2897,79;
Courfe WSW 6 : 40. Wefterly.

The Refult of fome others Anfwers are thefe following.

	1 Course ° ′ ″	Dist. fail'd Miles	2 Course ° ′ ″	Dist. fail'd Miles	X's val Miles	Time d. h.
Mr. *N. Oats*	5. 48 44$\frac{1}{2}$	1813,56	72 5 38	2343,41	1801	23 10$\frac{1}{2}$
Mr. *Bamfield*	49 43	1849,6	71 39	2287,6	1864	
Mr. *J. Ash*	49 43	1849,7				
Mr. *T. Ramsay*	39 50	1555	73 33	2542		22 6
Mr. *J. Watts*	148 44	1813	172 5	2343,		22 10$\frac{1}{2}$
Mr. *Rr. Scyth*	48 40	1853	72 8	2346	1796	23 17
Mr. *T. Cowper*	39 44	1555,4	73 32	2542		22 13

Question 238. answered by *Merones*.

Put c = Chord of the Arch requir'd; x = any variable Part of it; r = the Length of the Pendulum; t = time of the Descent in the Chord; and z = Time of Descent in the Arch. Then (by Ex. 10. Prop. xiii. *Mr. Emerson's Doctrine of Fluxions*, p. 114.)

$$\dot{z} = \frac{tr}{2} \times \frac{x^{-\frac{1}{2}}\dot{x}}{\sqrt{c-x}\ \sqrt{4rr-cx}} = \frac{tx^{-\frac{1}{2}}\dot{x}}{4\sqrt{c-x}} \times : 1 + \frac{cx}{2.4r2} + $$

$$\frac{3.c^2x^2}{2:4.16r4} + \frac{3.5.c3x3}{2.4.6.64r6} \quad \&c.$$ And by Forms 10 & 17 (Pages

62. 68. *ibid.*) of the Table, $z = \frac{t^2}{2} \times$ Arch whose Sine is

$$\sqrt{\frac{x}{c}} \times 1 + \frac{cc}{16r^2} + \frac{3^2 c4}{4.16^2 r4} \quad \&c. = \text{(when } x = c) \frac{3.1416t}{4}$$

$$\times : 1 + \frac{cc}{16r^2} + \frac{3^2 c4}{2^2 16^2 r4} + \&c. = t. \text{ per Quest.}$$ Therefore

(putting r = 1), $cc + \frac{3^2 c4}{2^2 16} + \frac{3^2 5^2 c6}{2^2 3^2 16^2} + \frac{3^2 5^2 7^2 c8}{2^2 3^2 4^2 163}$, $\&c. =$

4.3744. whence by Reversion $cc = 2,5107$, and $c = 1.5846$. the Chord of 104° 48′ the Arch thro' which the Pendulum must descend.

The same answered by the Proposer Mr. *Peter Kay.*

Let P = 3.14159; a = Length of the Pendulum; C = the versed Sine of the Arch described in the Descent; then the Time of Descent, or half the Time of Vibration will be,

$$\frac{a + P}{\sqrt{2}} \times 1 + \frac{c}{2\ 2.2a} + \frac{c^2}{2.2.4.4\ 4a^2} \quad \&c.$$ and the Time along the

Chord by $2\sqrt{2a}$; (as demon. p. 140. 141. of *Simpson's Fluxions*) which two Expressions must by the Quest. be equal

to each other; divide both by $\frac{a\frac{1}{2}p}{\sqrt{2}}$, and put $x = \frac{c}{2a}$; and

the Equation will become $1 + \frac{x}{2.2} + \frac{3.3\,x^2}{2.2.4.4}$ &c. $= \frac{4}{p}$ and

$\therefore x + \frac{3.3\,x^2}{4.4} + \frac{3.3.5.5\,x^3}{4.4\;6.6} + \frac{3.3.5.5\;7.7\,x^4}{4.4.6.6.8.8}$ &c.

$\left(\frac{16}{p} - 4\right) = 1{,}093$; Whence $x = \frac{c}{2a}$, will be found $=$

.642, and therefore $\frac{c}{a} = 1.284$; and consequently the re-
quir'd Arch $= 106°\ 32'$.

Mr. *Ramſhay*, by an eaſy Proceſs, finds the Arch $104°.\ 5'$.
Mr. *Watts* $= 104°.\ 48'$. *Gamſton Retford,* $= 106°.\ 32'$.

239. Queſtion was anſwer'd by the Propoſer, by Mr. *John
Landen,* Mr. *Samuel Bamfield,* Mr. *Ramſhay,* Mr. *Watts,* and
Gamſton Retford. The Ages 15. 18. 21. 25.

Mr. *John Aſh* anſwers it thus. There being given theſe Equat.

1. $a \times ee + uu + yy = 20850 = s.$
2. $e \times aa + uu + yy = 23238 = n.$
3. $u \times aa + ee + yy = 24654 = q$
4. $y \times aa + ee + uu = 24750 = b$

Then by common Algebra we get theſe two other Equat.

$e^2 + \frac{n}{e} = a^2 + \frac{s}{a}$;

$e^2 = a^2 + \frac{s}{a} - \frac{n}{e}$;

Which being ſubſtituted for e^2 in the firſt will produce this.

$a^3 + s - \frac{an}{e} + u^2 + y^2 = s$; $\therefore uu + yy = \frac{an}{e} - a3$, which

being put for $u^2 + y^2$ in the ſecond, we have $eaa + an - ea^3 = n$; $\therefore e = \frac{an - n}{a3 - a^2}$; and $ee = \frac{a^2 n^2 - 2an^2 + n^2}{a^6 - 2a5 + a4}$; and

$\frac{n}{e} = \frac{a3 - a^2}{a - 1}$; Then for ee, and $\frac{n}{e}$ write their Values in the

6. and it produces $\frac{a^2 n^2 - 2an^2 + n^2}{a^6 - 2a5 + a4} = \frac{sa - s}{a^2 - a}$; Whence

$a = 15,\ e = 18,\ u = 21,$ and $y = 25.$

240. Question answer'd by F. R. S.

In the given Fruſtum of the Cone let AB=D40 ; gG=d=20, GP=b=90. And put AG=t the tranſverſe Diameter ; nm=C the Conjugate ; GB=Z ; and Cc=x. Extend the Tranſverſe to C, and draw the two Perpendiculars to it Cc and IB.

Then by ſimilar $\triangle$s
$$\begin{cases} t : b :: D : \dfrac{Db}{t} \\ Z : \dfrac{Db}{t} :: f : \dfrac{Dbf}{Zt} \\ \dfrac{D{-}d}{2} : z :: \dfrac{d}{2} : \dfrac{dz}{D{-}d} \end{cases}$$

Subſtitute $\dfrac{dz}{D{-}t}$ for f, then Cc $(x)=$ $\dfrac{Ddb}{Dt{-}dt}$, then x is nearly 38. which multiplied by $\frac{1}{3}$ of the Area of the Ellipſis, An Gm viz. $\dfrac{,7854tc}{3}$, or ntc, gives $\dfrac{Dbdnc}{D{-}d}$, the Solidity of ACGmA, from which take the Solid gCG, i. e. $\dfrac{ddnbd}{D{-}d}$, leaves $\dfrac{Dbdnc{-}d^3nb}{D{-}d}$ the Content of AgGA. But nm $(=$C$)$ is known to be a meanProportional between AB and gG ; i. e. $\sqrt{Dd}$=C.

Whence $\dfrac{Dbdn\sqrt{Dd}{-}d^3nb}{D{-}d}$ = leſſer hoof AgGA. $\dfrac{D^3bn{-}Ddn\sqrt{Dd}}{D{-}d}$ = greater hoof ABGA.

But in this Example, as $2d=$D, the Theorems are reducible, $\overline{D\sqrt{Db}{-}d^2}\times\dfrac{.2618db;}{D{-}d}$ is $2d\overline{\sqrt{2dd}{-}d^2}\times\dfrac{.2618db}{2d{-}a}$, i. e. $2dd\overline{\sqrt{2}{-}d^2}\times.2618h$, or $2\overline{\sqrt{2}{-}1}\times,2618hd^2$. In Numbers, $1,8284\times90\times400\times2618=17232,304$ the leſſer hoof, and $\overline{D^2{-}d\sqrt{Da}}\times\dfrac{.2618Db}{D{-}d}$, becomes $4dd{-}\sqrt{2dd}$ $\dfrac{.2618h2d}{2d{-}d}$; That is, $4dd{-}dd\overline{\sqrt{2}}\times.2618\times2h$, or $4{-}\sqrt{2}$

Therefore in Numbers $2.5858 \times 2618 \times 180 \times 400 = 48741,2956$ the greater Ungula. Which Ungula's together make the whole Fruit 65973.6.

The same answer'd by *Merones*.

Let L be the Center of the Ellipsis $A n G m$, $m L n$ the common Section of it, and the Circle $H n I m$, and draw GK paral. to HA &c. Since GA is bisected in L $\therefore$ LI $= \frac{1}{2}$ DC, and LH $= \frac{1}{2} gG$; Whence $n L|^2 = HLI = \frac{1}{4} gG \times AB$, and $n m$, $= \sqrt{Gg \times AB}$, and the Area of the Ellipsis $C \times GA \sqrt{Gg \times AB}$ (c being $= .7854$) by similar Triangles $AB : CD : KB : GP$ $= \dfrac{CD \times RB}{AB}$. And as $AK : \dfrac{CD \times KB}{AB} : : \frac{1}{2} AB : DL = \dfrac{KB \times CD}{AK}$; Whence $CL = CD \times \dfrac{AK \times KB}{AK} = \dfrac{CD \times gG}{AK}$; Again

$GA : AK : : (CL) \dfrac{CD \times Gg}{AK} : Cc = \dfrac{CD \times Gg}{GA}$; $\therefore$ the

Area Ellipsis $\times Cc = \dfrac{C \times CD}{3} \sqrt{Gg \times AB}$ = Solidity of GCA;

But $C \times Gg^2 \times CD$ = Solidity GCg; and $\dfrac{C \times AB^2 \times CD}{3}$ = solid

BCA; whence $\dfrac{C \times CD}{3} \times$ into $AB^2 - Gg \sqrt{Gg \times AB}$ = Ungula GAB; and $\dfrac{C \times CD}{3} \times \sqrt{Gg \cdot AB} - \dfrac{C \times Cd}{3} Gg^2$ = Ungula GgA; Hence putting the Height GP=H AB=B, Gg=b $c = .7854$; then $\dfrac{CHB}{B-b} \times \dfrac{B^2 - b \sqrt{Bb}}{3}$ = the greater Ungula

GAB = 48740,55 : And $\dfrac{CHB}{B-b} \times \dfrac{B \sqrt{Bb} - bb}{3}$ = the lesser Ungula GgA = 17232,055. Q. E. I.

Bironnos has answer'd this 240 Question, in a Method something different from the two last.

Let fall the Perp. AN upon GB; put $2a$ = greater Diam. AB, $2q$ = lesser gG. Their half Sum AK = m; half Diff. KB = u; the Frustum's Height GP = d; and $.78539^2$, &c. = S; then $\sqrt{a^2 + m|}$ = AG the Transverse, and $2\sqrt{aq|}$ = the Conjugate: Then *per Sim. Triang.* KB : GP :: gd : CD = ; and :: BD : DC = $\dfrac{da}{u}$ and *per* 47. *e.* 1. $cG = q \sqrt{n^2 + a|}$;

Again, $GB : GP :: AB : AN = \dfrac{2da}{\sqrt{d^2 + n^2}}$, and $AG : AN :: cG$

$: cC = \dfrac{2daq}{n\sqrt{d^2 + m^2}}$; hence the Solidities of the Cone ACB,

$= \dfrac{4a^3sd}{3n}$; of $CgG = \dfrac{4q^3sd}{3n}$; and the Scalenous CAG, is

$= \dfrac{4sdag\sqrt{aql}}{3n}$; whence the Solidity of the greater Hoof AGB

$= \dfrac{4asd}{3n} \times a^2 - q\sqrt{aql}$; and leſſer $\dfrac{4sdq}{3n} \times a\sqrt{aql} - q^2$; or put-

ting Fruſtum's Height $= A$, greater Diam. $= D$; leſſer $= d$;
Diff. $= x$, mean Proportional between B & $78539 = S$;

Greater Hoof $= \dfrac{DAS}{3x} \times DD - Bd = 48741,05.$

Leſſer Hoof $\dfrac{dAs}{3x} \times DB - dd = 17232,55$, &c.   Q. E. I.

Mr. *Tho. Atkinſon,* and Mr. *Tho. Ramſbay,* have each brought out
Theorems and True Solutions by the common Method of Algebra.

A Scheme of ANSWERS F. R. S.	Greater hoof	Leſſer hoof	Cont. of Fruſ
Mr. *Ward,* Math. p. 414.	48741,295	17232,304	65973,599
Mr. *Robertſon,* p. 160.	50267,03	15708,2	65975,23
Mr. *Dary's* Gauging	51836,4	14137,2	65973,6
Mr. *Tho. Atkinſon*	47124	18849	65973
Mr. *Tho. Ramſbay*	48747,156	17226,443	
Mr. *Turner*	48741,2	17232,0	
Merones	48741,012	17232,967	
Mr. *Arcb. Scytb*	48740,559	17232,055	65972,614
	48687,16	17216,04	65923,20

OBSERVATIONS.

I have been more particular in bringing out the Anſwers to this
Queſtion, and adapting the ſeveral Solutions to one Scheme or Figure, by
reaſon the Point has been controverted and by ſome doubted, whether any
Solution could be had without Fluxions and Infinite Series: But ſince the
firſt inveſtigating the Theorems above (29 *June* 1741.) Mr. *Shirtcliſt*
has publiſh'd his curious Treatiſe of Gauging 1742. where this Problem
is ſolv'd, and now we abound in true Solutions.

Mr. *Ward* (in his excellent Math. Guide, p. 414.) has given Theo-
rems for this Problem, which I have brought to this Example, but has
found fault with Mr. *Dary's* Theorems, tho' much better than his own,
and then the neareſt the Truth of any publiſh'd. Mr. *Robertſon,* in
1739. publiſh'd a Treatiſe of Menſuration, wherein he accuſes Mr. *Ward*
as giving a falſe Rule, when at the ſame time his own is the moſt erro-
neous of any, and the wideſt from Truth; as may be ſeen in the Scheme
above.

In the ſeventh Edition of *Ward's* Book 1740. there's a Note publiſh'd

The 241. Queſtion anſwer'd by Mr. *J. Turner* of *York.*

Let b=Length of the Semidiurnal Arch=1,8233; x=Arch of the Hour from Noon, its Coſine $= 1 - \dfrac{x^2}{2} \times \dfrac{x4}{24} - \dfrac{x^6}{720}$ &c. d=Rectangle of the Sines of the Lat. and Declination=.1493; c=5979 the Rectangle of their Coſines; then $c \times 1 - \dfrac{x^2}{2} +$

$\dfrac{x^4}{24} - \dfrac{x^6}{720}$, &c. $+ d$ Sine Sun's Altitude; and $cb + cx \times 1$

$- \dfrac{x^2}{2} + \dfrac{a4}{24} \dfrac{x^6}{720}$ &c. $+ db + dx$ by the Queſtion muſt be a Maximum, which put into Fluxions and reduced gives $cbx +$

$\dfrac{3cx^2}{2} - \dfrac{cbx^3}{6} - \dfrac{5cx^4}{24} + \dfrac{cbx^5}{120}$ &c. $= c + d$ 1,09015 $x +$

$8968x^2 - .1817x^3 - ,1246x4 + .0991x5$ &c. $= ,7472.$ Here $x = 5049 =$ an Arch of 28° 56', ſo the Time is 1ʰ 55' 44'' poſt Meridiem.

Q. E. I.

An Anſwer by Mr. *Theeker.*

Put Radius=1; d & c for the Sine and Coſine of the Sun's Declination; b and $a =$ Sine and Σ of the Latitude given; x and y the Sine and Cosine of the Hour from Noon; Z the Arc itſelf, then by Spheries $db + cay =$ Bo the Sine of the Sun's Altitude; which being much multiplied by $+$ Z ($n =$ Semid. Arc) the Arc of
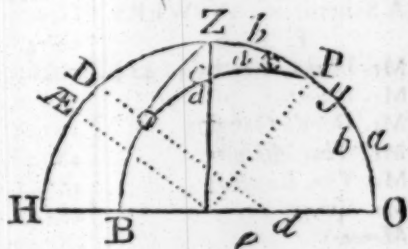
Time paſs'd over from Sun Riſing, gives $\overline{db + cay} \times \overline{n + Z}$; which by the Queſtion is proportionable to the Heat, and muſt therefore be a Maximum; put into Fluxions is $cay \times n + Z + Z \times$ $\overline{db + ca} = 0$; but by the Nature of the Circle $x : 1 :: -\dot{y} : \dot{Z}$

$-\dfrac{\dot{y}}{x} = \dot{Z}$; which put for $\dot{z}$ is $\overline{cay} \times \overline{n + x} - \dfrac{y}{x} \times \overline{db +}$

$\overline{cay} = 0$; and therefore $\overset{\cdot\cdot}{cay} \times \overline{n + Z} = \dfrac{\dot{y}}{x} \times \overline{db + cay}$, which di-

vided by $\dot{y}$ gives $\overline{ca \times n + Z} = \dfrac{1}{x} \times \overline{db + cay}$; this divided by ca

will make $n + Z = \dfrac{1}{x} \times \dfrac{db}{ca} +$;

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From which Equation it appears that the hotteft Time of the Day is, when the Arc of Time pafs'd over from Sun-rifing is equal to the Rect-angle of the Tangents of the Sun's Declination and Latitude, Plus the Co-fine of the Hour or Arc from Noon, drawn into the Cofecant of the Arc pafs'd over fince Noon. In Numbers; the Tangent of Sun's De-cline $10^\circ 53' = 9,2839070$ multiplied by Tangents Lat. $52^\circ 30' =$ Log. 10.1150195 gives $9,3989265 =$ Cofine 75.290 the Arc of Time from Midnight, which fubftracted from 180 leaves $104^\circ 30' 20''$ the femi-diurnal Arc $= 12$; to which 28.56 Time after Noon makes $133^\circ 26' 20''$. This in Decimals of Degrees, multiplied by 0174532, &c. [i. a. $360)6,28318(.01745]$ gives the Arch of the Circle $2,3263535$; And Tang. Decl. $\times$ Tang. Lat. $=,2505642$. Plus Σ Arc $28^\circ,56'' =,$ 8751832 from Noon $(=n+z)$ is $1,1257474$ multiplied by the Cofecant $28^\circ,56' = 2,0670056$ gives $2,326$ &c. equal to the other Side of the Equation, which is proved right. But the Arch from Noon is found thus: If v be put for the Number of Degrees pafs'd over fince Noon; then will $,017453 \times 164^\circ.30' + v = $ Cofec. $v \times ,250,642 + 2v$; whence by a few Tryals, v may be found $= 28^\circ, 57'$, which in Time is 1 hour $55' : 48''$ Afternoon.

If any one fhould diflike this guefling Method, this following may be thought more valuable, *viz.*

Put $t, =$ Tangent of half the Time from Noon; then will

$$\frac{2t}{1+t^2} = x; \text{ and } \frac{1-t^2}{1+t^2} = y;$$

(See Prob. 23. vol. i. Coll. *Quef.*

alfo by the Nature of the Circle, $z = 2t - \dfrac{2t^3}{3} + \dfrac{2t^5}{5} - \dfrac{2t^7}{7}$,

&c. whence $n + Z = \overline{\dfrac{1}{x}} \times \dfrac{db}{ca} + y$ is $n + 2t - \dfrac{2t^3}{3} + \dfrac{2t^5}{5}$, &c.

equal to $\overline{\dfrac{1+t^2}{2t}} \times \dfrac{db}{ca} \times \dfrac{1-t^2}{1+t^2} + 1 - t^2$; and the Equation order'd

$$\left.\begin{array}{c} +2n \\ -2 \end{array}\right\} t \left.\begin{array}{c} +4 \\ -bd \\ \overline{ca} \end{array}\right\} t^2 + 2t^3 - \frac{4t^4}{3} + \frac{4t^6}{5} + \frac{4t^8}{7} + \frac{4t^{10}}{9}, \text{&c.} =$$

which Series reverted will give the Value of $t = $ Tan. $14^\circ 28$

The 242 Queftion anfwer'd by Mr. *T. Cooper.*

$c = 57.24.52$. Cofine of Z 1. $t = 55.35.19.$ Cofine of Z 2. $d = 53$ 16.15. Cofine of Z 3. $b = 6.30$. Sine of 1 P2. Σp. $m = 12.45$. Sine of 1 P 3. Σn. x DPI. Σ, y. then

$\left\{\begin{array}{l} py - bx = \Sigma \text{ ZP2.} \\ ny - mx = \Sigma \text{ ZP3.} \end{array}\right.$

Then by the 1 Theo-rem in the Lady's Di-

ary 1742. p. 8. we have $\dfrac{c+ty-t-cpy+chx}{y-py+hx} = {}^{\Sigma}ZD.$ and

$\dfrac{c+dy-d-cny+cmx}{y-ny+mx} {}^{\Sigma}.ZD.$ which tranfpos'd and reduc'd is

$cpy^2+tny^2+dy^2-dpy_2-cny_2-ty^2+chx+tmx-dhx-cmx=cpy$ $+tny+dy-dpy-cny-ty+chxy+tmxy-dhxy-cmxy.$ Put $r=cp+tn+d-dp-cn-t$; or $= ,0001692$; and $s=ch+tm$ $-dh-cm$, or $= ,00077322$; then the Equation above, after Subftitution will ftand, $ryy+sx=ry+syx.$ i.e. $sx-sxy$ $=ry-ryy$, and dividing by $1-y$, we have $sx=ry \therefore \dfrac{x}{y} = \dfrac{r}{s}$

the Tangent of 12° $20'$ $36''$. confequently, 1^{ft} Obfervation was 12^h $49'$ $22''$. The 2^d at 1^h $15'$ $22''$. The 3^d at 1^h $40'$ $22''$. PM. And by the 1^{ft} and 2^d Theo. in the fame Diary, is found the Sun's Meridian Altitude $= 58^, 15' 57''$ his feptentrional Depreffion $= 17^\circ 20' 35''$; hence the Latitude is $51^\circ 58' 49''$ and $\odot$'s Declination $= 20^\circ 45' 36''$ North.

The fame anfwer'd by F. R. S.

Let the Quantities be reprefented as above and per Scheme; let r and s, $=$ Sine and Cofine of the Latitude; a and c the Sine and Cofine of the Sun's Diftance from the Pole.

Then in the 3 Triangle by the Spheric Theo. We have
$\begin{cases} (1)\ er+asy=c \\ (2)\ er+aspy-ashx=t \\ (3)\ er+asny-asmx=d \end{cases}$

In the (1) $er = c-asy$, which fubftituted in the other two make (4) $c-asy+aspy-ashx=t$; (5) $c-asy+asny-asmx=d$:

per (4) $-asy+aspy-ashx=t-c=g \therefore$ as $= \dfrac{g}{-y+py-hx} =$

$\dfrac{g}{-y \times 1-p-hx}$ call $1-h=v=$ verfed Sine $6^\circ 30'$, then will

$as= \dfrac{g}{-yv-hx}$; by the $5-asy+asny-asmx=d-c=k.$ $as=$

$\dfrac{k}{-y+ny-mx} = \dfrac{k}{-y \times 1-n-mx}$, and if $1-n=w=$ vèr. S.

$12^\circ 45'$ then, will $as= \dfrac{k}{-yw-mx}$ confequently $\dfrac{g}{-yv-hx} =$

$\dfrac{k}{-yw-mx}$; or, $\dfrac{g}{yv+hx} = \dfrac{k}{yw+mx}$, which out of Fractions

$gyw+gmx=kyv+kkx \therefore \dfrac{x}{y} = \dfrac{kv-gw}{gm-kk} =$ Tangent of the

ngle DPI $= 12^\circ 20' 36'' =$ Time $49' 22'$. Whence the Anfwer will come out as above.

I cannot but be perſuaded that this curious Problem will point out a Way to be very uſeful in Navigation, for determining the Longitudes as well as Latitudes, for, ſuppoſing at Sea we knew neither, or had not the Time of the Day, but were furniſh'd with a Quadrant to take Altitudes of the Sun, and could find the Difference in Time between each Obſervation, which a common Pocket Watch with a Minute Hand would give us very well, or with a ſecond hand better. For tho' that Watch or a Clock was incapable of keeping true Time at Sea, yet it might very well meaſure a few Minutes between one Obſervation and another, in which Space the Error muſt be very inconſiderable. Now when this was d ne, by ſolving this Problem, we get the Latitude and the true Times of the Day, and then it would be no very difficult Taſk to rectify the Longitude pretty near. In order to this we ſhall deduce a Theorem in words, by which any one that is but ſkill'd in the common Caſes in Trigonometry may put it in Practice.

A Theorem for the Hour of the Day.

1. The Difference between the firſt and ſecond Altitude, drawn into (*i. e.* multiplied by) the verſed Sine of the Arch of Time between the firſt and ſecond Obſervation; made leſs by the Difference between the firſt and ſecond Altitude, multiplied into the verſed Sine of the Arch of Time between the firſt and third Obſervations.

2. The Difference between the firſt and ſecond Altitude, drawn into the right Sine of the Arch of Time, between the firſt and third Obſervations; Minus the Difference between the firſt and third Altit. drawn into the right Line of the Arch of Time between the firſt and ſecond Obſervations.

Laſtly, Divide the former Difference by the latter, and the Quotient will be the Tangent of the Arch of the Time from Noon.

The 242 Queſtion anſwer'd by Mr. *J. May* the Propoſer.

Put $a=$ Sine 57°. $24'$. $52''$; $b=55^{\circ}$. $35'$. $19'$; $c=53^{\circ}$. $15'$. $16''$, the Sine of 26 Minutes or 6°. $30=m$, $\Sigma=n$, $f=$ Sine 12°. $42'$ $(=,1$ min.) the Time between the firſt and laſt Obſerv. its $\Sigma=g$; Radius$=1$; Then put $a-b=b$; $a-c=i$, $r-n=s$, $r-g=t$; Then the Tangent of the Hour Angle from Noon when the greateſt Altit. was taken will be $=$

$$\frac{bt-is}{mi-bf} r=,2190328=12^{\circ}. 21'. 16'' \text{ which in Time is } 49'. 25'',$$

or after 12 a Clock: The ſecond 1^{h}. $15'$. $25''$; and the laſt at 1^{h}. $40'$. $25''$, according to the Altitudes Decreaſe.

Now put the Coſine of 12°. $21'$. $16''=d$; 25°. $6'$. $16''$ (the Arc of 1^{h}. $40'$. $25''$ Time of the laſt Obſervation) $=e$; put likewiſe $d-e=q$, $r-e=l$, and $r+d=p$.

Then the Sine of the Sun's ſouthern Altitude will be $=b+\dfrac{li}{q}$ (ſee his Anſwer 222 Queſt. p. 7. Diary 1742.) The Degrees of which put $=w$. Likewiſe the Sine of the Sun's Depreſſion in the North will be $\dfrac{pl}{q}---a$; the Degrees of it put $=u$, then the Sun's Declinat. will be $\dfrac{w+u}{2}=$ 20°. $47'$ nearly; and the Coſine of the Latitude $\dfrac{w-u}{2}=38^{\circ}$. $4'$. $45''$ and 51°. 55. $15''$ the Latitude required.

The 243d QUESTION, *answered by Mr.* J. LANDEN.

THE Bodies are A . . B . . C ⎰ Then according to Mr.
Their Weights 3 . x . 27. ⎱ *Keil's* Introduct. Phyf.

we have $\dfrac{2a}{x+a} =$ the Celerity wherewith the Body B

will approach C, and $\dfrac{4xa}{xx+xa+xc+ac} =$ the Velocity of

C after the Impulfe; the Fluxion of which being made $= o$,
and reduced, we have $x = 9$, a mean Proportional between
A and C.

Mr. THO. COWPER's *Anfwer.*

THE Bodies and Weights denoted as above, and put-
ting $\angle$ to exprefs the Velocity of A; from Dr.
Keil's Demonftration about the Motions of elaftic Bodies is
deduced this Analogy: As the Sum of the Bodies : is to twice
the Weight of the moving or ftriking Body : : fo will the
Velocity of the ftriking Body be before Percuffion : to the Ve-
locity of the quiefcent Body after it.

That is, $x+a : 2a :: \angle : \dfrac{2a}{x+a} =$ Velocity B after the

Stroke. Again, $x+c : 2x :: \dfrac{2a}{x+a} : \dfrac{4ax}{xx+cx+ax-ca} =$

Celerity of C, after the Stroke; which, *per* Queft. is a *Maxi-*
mum, and the Fluxion thereof $4ax^2\dot{x}+4acx\dot{x}+4a^2x\dot{x} - 8ax^2$
$\dot{x} -4acx\dot{x} -4a^2x\dot{x} = o$. Reduced, gives $x = \sqrt{ac} = 9$
Pounds.

Mr. *J. Watts's* Anfwer is in the fame Method : Mr. *Wil-*
liam Honnor, from *Mac Laurin's* Fluxions, p. 429; Mr.
Fowle the Propofer ; Mr. *J. Turner* ; *Bironnos* ; Mr. *S. Bam-*
field ; Mr. *Afh* ; Mr. *Ric. Sowerby* ; and *Philotechnus,* have
anfwered this Queftion.

The

The PRIZE QUESTION,

Anſwered by Mr. A. THACKER.

PUT $a = 6$ Feet ⎱ the Height ⎰ A ⎱ The Line AB $= 3\overline{5}$
$b = 18$ } of the Staves { B } Feet $= d$ (which
$c = 8$ ⎰ at ⎱ C ⎰ was in the Diary

30 Feet, an Error) the Diſtance between the Top of the
Staff B, and Bottom of the Staff B ($= a$B) call e; the Diſ-
tance between the Top of the Staff B, and Bottom of the Staff
A ($= b$A) call f; then will $\frac{\overline{c+a} \times \overline{e+f}}{2b+2a} + \frac{\overline{b+a} \times \overline{c-a}}{2e+2f} =$

$m = 21,0789$, the Diſtance from the Top of C to the Bot-
tom of A. Then (by 47.$E.1$.) AC is found $= 19,501$, which

call x; alſo, $\frac{\overline{c+b} \times \overline{e+f}}{2b+2a} + \frac{\overline{b-c} \times \overline{b+a}}{2e+2f} = n = 40,216$

the Length between the Top of B, and Bottom of C; and
hence CB is found $= 35,962 = z$. Now putting $\frac{be-fa}{df+de} =$

$h = 16111$; $\sqrt{x^2+a^2} = s = 20,404$; $\frac{cs-am}{xm+xs} = k =$

$,0454$; and $\frac{d^2+x^2-z^2}{2dx} = v = ,13501$; then will ſine A

$\frac{2-2v^2}{1+h^2+k^2-2hkv-v^2} = 1,948315$; the verſed Sine of a

Arc, which is double the Latitude 161° 30′; whoſe half
$= 80°$ 45′, the true Latitude required.

Now calling the Sine of the Latitude p, then will $\frac{pc=pc}{s+m}$

$= ,33309 =$ the Sine of 19° 27′, the Sun's Declination
North.

Sir *I. New-ton*, the Author of this Problem, finds the Lat. 80° 45′ 20″, and Declinat. 19° 27′ 20″, as may be seen in the 42d Prob. of his Univerſal Arithmetick, in the *Engliſh* Edition, 1720, p. 151. where the Tranſlator Mr. *Raphſon*, Mr. *Cunn*, or the Printer, committed a Blunder, mak-

ig the Line AB =30, inſtead of 33. By Reaſon of which iſappointment, the Solution is here ſhorter than was de-gn'd; but the Inveſtigation of the Theorems above, we ave printed in the firſt Volume of Diary Queſtions. If the ne AB was = 30, then the Latitude is 80° 4′ 7″, and eclination 21° 7′ 4″. And Mr. *Ed. Croſs* has found it °4′ 11″, and Declination 21° 7′ 48″.

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ew ÆNIGMA's, *to be anſwered in the next* DIARY.

I. ÆNIGMA 260. *By* PHIDIPIDES.

ADIES, to aid your Conception in ev'ry Degree,
Concerning ſo ſhapeleſs a Creature as me,
I'll tell you my Birth without any deceiving,
ſtrong Conſtitution, and Manner of Living.
procure the Ingredients my Structure demands,
ey oft' have Recourſe to Foreigners Lands;
havock the Ocean, and murther at Sea,
purchaſe a part of what conſtitutes me.

It grieves me to view then an innocent Creature,
Her Bowels confume to provide for my Nature.
    In artful Inclofure, a Skin on each Side,
Oh! grand Impofition! all Favours deny'd,
My ftouteft Affiftant is barr'd from the Light,
In fatal Obfcurement conceal'd from the Sight,
My Body compounded, and work'd into Shape,
Or at leaft to a Pofture, no *Monkey* can Ape ;
So enormous a Monfter, as now I appear,
Devoid of an Head, and without any Ear ;
So artfully form'd, and produc'd into Birth,
I'll vouch it fcarce ever appear'd upon Earth.
I'm grac'd with as crooked and awkward a Snout,
Tho' not quite fo long, nor fo fpacious (I doubt)
As much like a *Swine's*, as one *Pea* to another,
(For if I had Noftrils, I'd call him my Brother.)
For Legs, I can venture to fay within Bound,
I've twelve, if not more, tho' they ne'er touch the Ground.
LADIES! Grant me the Favour to raife your Surprize,
In relating my wonderful Number of Eyes ;
If narrowly fearch'd more than thirty you'll find,
Yet (ftrange to be told) they all center behind :
The Food that my kind Benefactor beftows,
I receive at my Eyes, at my Patron's difpofe.
The Provifion I take never hinders my Sight,
I receive it at Morn, and difcharge it at Night.
Yet, tho' fuch a wonderful Form I fuftain,
So lumpifh a Monfter devoid of a Brain ;
With you, LADIES, I bear an unlimited Sway,
And always accomplifh my Labour by Day.
And then, like the reft of the World, I delight,
To take my Repofe in the Gloom of the Night.
My deftin'd Employment I feldom refume,
Till *Sol* has difperfed from *Æther* the Gloom ;
Then quick to the Center of Gravity move,
The Center of Gravity, Center of Love.
No Swain, but would count my Employment an Honour,
No Lady would blufh to confine me upon her.
    Now, LADIES, I beg, you'll this Myftery unfold,
I dare tell no more of myfelf than I've told.

II. ÆNIGMA 261. *By Mr.* WILLIAM CHAPPLE.

WHEN the whole Univerfe lay felf-confin'd,
    And Worlds on Worlds were in one *Chaos* join'd ;
        E'er Nature's *Embrio* ripen'd into *Birth*,
Or Motion was imparted to the Earth ;
Before the Planetary Dance begun,
Or peopl'd Stars revolv'd about their *Sun* ;

Being had : —— And Purity like mine
May boaft of its Original Divine ;
And as its Birth-right claim the Complement
Of thofe, who ftile me, *the moft Excellent.*
Th' Omnipotent, who fits enthron'd on high,
In all the State of awful Majefty,
Has fo far honour'd me, that I am one
Of thofe pure Beings, which attend his Throne.
Nor is my Refidence to Heav'n confin'd,
I'm prefent with, and ufeful to Mankind ;
By whom I'm highly priz'd, fince 'tis to me
They owe (at leaft) their chief Felicity.
With an incredible Celerity,
From *Heav'n* to *Earth* I in a trice can fly ;
From whence returning, can again as foon
Extend my Flight beyond the Silver *Moon* ;
And in few Minutes lengthen out my Race
Thro' the vaft Regions of unbounded Space.
Tho' I have conftantly been felt or feen,
My Nature ever hath myfterious been,
Till a Philofopher of Worth and Fame
Anatomiz'd me, and difcern'd my Frame.
A Company of fond conceited Elves
Would fain ingrofs me wholly to themfelves ;
How vainly, let th' Obferver judge, who fees
To what a Height I *Flora*'s Charms increafe.
Ye beauteous Fair, who do that Jewel prize,
Which with Artillery furnifhes your Eyes,
Perufe the Riddle, and beyond all doubt,
Before you've read me twice, you'll find me out.

III. Æ N I G M A 262. *By Mifs* CH——BERS.

I Am a very ufeful Thing, extracted from the Earth
By Art and Labour, roughly us'd before and after Birth.
My Maker's Ingenuity appoints the Shape I wear,
Sometimes I like a Wheel am round, but moftly I am fquare.
Tho' homely be my Garb and Mien, in Courts of Kings I'm us'd ;
Lord O——d he made ufe of me, or elfe he is abus'd.
In almoft every Family I'm held in great Requeft,
Becaufe I'm known to give new Guft to Scraps of *Chriftmas* Feaft.
Further I fay, and true I may, that altho' I am able
To fill the Purfe and Belly too, I ne'er appear at Table.
Now, LADIES, as I'm pretty fure, each of you is a Lover
Of what I do prepare for you, I pray my Name difcover.

IV. ÆNIGMA

IV. Ænigma 263. *By Mr.* Rob. Hoare, *of* Sturdy's Caſtle.

MY Parent brought me forth without a Head,
    Then lay I uſeleſs, motionleſs, and dead;
    But ſome time after, moſt ingeniouſly,
By's godlike Art, he plac'd ten Heads on me.
I, taking Huff at cruel Blows, ſet out,
And boldly range the Country round about;
To Cities, Towns, and Villages I roam,
And well attended am where e'er I come:
Why ſhou'd I not? I much deſerve their care;
Tho' carried, yet a mighty Weight I bear.
When thro' the Streets I paſs in darkeſt Nights,
I make young Sparks attend me with their Lights.
But ſuch a Shape as mine I'm ſure was never,
I march along with Head and Heel together:
And am ſo low of Stature, ſo minute,
I can't avoid being trampled under Foot.

V. Ænigma 264. *By Mr.* Ralph Hulse.

REmark the Sage, whoſe Genius far renown'd,
    This wond'rous Dome did raiſe, this Fabrick found!
    This Praiſe to *Shenkin Britain* ever gives,
And ſtill the Inventor by the Invention lives.
Long may he live, whoſe Memory (we find)
In Verſe immortal ſhines, and ſtands refin'd.
Ladies, vouchſafe to lend an Ear a while,
And take a View " of the ſtupendous Pile:
" In Form quadrangular two Planks are laid,
" One founds the Baſis, and one crowns the Head;
The Sides with Bolts and Bars ſupported round,
On which ſtrong Columns ſtand erect, and ſound;
An Entry does inſidiouſly enſnare,
With hoſpitable Look, the Felon near;
" But from above depends a threat'ning Board,
" Hung by a Twine, like *Democles's* Sword.
  " High on the Surface of this Fabrick ſtands
" A Pole, on whoſe notch'd Head a Beam expands
" Its wooden Arms, and pois'd alike in all,
" One End moves upwards by the others Fall.
Within this Dome a ſlender Thread depends,
Which from a Window down above deſcends;
" Which pendulouſly wantons here and there,
" And at the ſlighteſt Touch plays looſe in Air.
The lower Part, or Cell (the Will of Fate)
Is fill'd, like Store-houſe, full of luſcious Meat:

" T

" The upper Part does treacherously seem
" To bite with deadly Teeth th' extreameſt Beam.
No ſooner enters in the Villain Foe,
" But inſtantly ſhe lets the Portal go!
There without Bail, Compaſſion, or Relief,
Too late for Succour calls the dying Thief!
" In mournful Plight he's ſwallow'd unawares,
" Forgetful of his own, that minds another's Cares.
    LADIES, you ſee, I've play'd the Builder's Part,
In what's erected thus by Rules of Art ;
Obſerve the Plan, and then you will, no doubt,
What's here in myſtic Lines conceal'd, find out:
If ye the ſame will to the World make clear,
I'll do as much for you another Year.

VI. ÆNIGMA 265. By PATRIZO.

I 'Ve an *Head* pretty large, but to tell you the Truth,
    'Tis furniſh'd with neither *Eyes, Noſe*, or a *Mouth*;
    But ſuch as it is, 'tis applied to another,
Who perhaps is my *Father*, or *Siſter*, or *Brother*.
On my *Head*, like the *Ladies*, a Ribbon I wear,
Which by the Artificer's platted with Care,
To make me look ſmar, when abroad in the Air.
To heighten yet farther the Charms of my Face,
Some dreſs me in *Silver*, and others in *Braſs*.
To appear in moſt Colours I'm known to delight ;
With the *Grave* I'm in *Black*, with the *Beau* I'm in *White* ;
But when I am purchas'd by *Roger* the Clown,
'Tis odds but I'm dreſs'd in a deep Ruſſet brown.
The King and the Peaſant do equally ſhare
My friendly Aſſiſtance, and ſo do the Fair ;
Thro' lonely By-ways I often do guide 'em,
And ſafely conduct, that no Harm may betide 'em.
If at *Windſor* the *King* does unharbour the *Deer*,
Then I cloſe by his Majeſty's Perſon appear,
And am ſeen Cheek-by-jole in the hotteſt Career.
I ſhake Hands with the King, and we part at St. *James*,
For the Chace was ſoon over,——- the Deer croſs'd the *Thames*.
In his Equipage lately abroad I was ſent,
But I hope it was not with pacifick Intent ;
Not to ſhine in my ſplendid Attire at Review,
Nor to make at the Head of his Troops a grand Shew ;
But to lead his brave Soldiers to conquer thoſe Foes,
Who've diſturb'd many Years *Britannia's* Repoſe.
    One Hint to the LADIES I can't but reveal,
I do them moſt good, when they've hold of my Tail.

VII. ÆNIGMA 266. *By* PAZZONE.

I Never more than one Foot use,
  So need I not a Pair of Shoes:
  Sometimes my Head is cover'd o'er
With Duft, as *Jews*, who Sackcloth wore;
At others, brisk I dance around,
Then am I smart, and chearful found:
When to my Lover's Arms I'm led,
Oft like *French* Dames I put on red;
Who, when my sparkling Looks he spies,
Does with my Gayness sympathize.
The Miser, with curst Jealousy,
Close locks me up from human Eye;
Grudges himself of me the Use,
If others Store don't me produce.
Tho' Palaces difdain me not,
I'm sometimes found in homely Cot;
And often on a Market Day,
My frantick Tricks I'm us'd to play;
Where seldom Bargain Folks begin,
But I forthwith am call'd for in.
The strongest Hate I oft' compose,
And bring the dearest Friends to Blows:
Scorning Disguise, I use no Art,
You may see thro' my very Heart.
  Perhaps by this Time, it is meet
T' inform you of my final Fate:
Most usually a Creature tir'd,
And with too frequent Pleasures fir'd,
Stamps me to Death; deform'd I lie,
Threat'ning to bite whoe'er comes nigh;
'Till my diffever'd Limbs are ta'en,
And *Roman* like in Urn are lain;
Then from my Ashes a bright Heir
Shall, like the *Phœnix*, soon appear.

New MATHEMATICAL QUESTIONS, *to be answered in the next Year's Diary.*

I. QUESTION 244. *By Mr.* J. TURNER.

I F a *Flexible Chain, eighteen Inches long,*
  On *two Pins Horizontal* was hung;
  Whose Diſtance afunder, exactly ſhall be
A *Foot*; its lowest Descent then let's ſee.
A *Theorem* that's general give, for to find
The *Areas* of all ſuch *Curves* of that Kind.

II. QUESTION

II. QUESTION 245. *By Mr.* JOHN LANDEN.

I Have *one hundred* Pieces of Gold ; fome of which are *Piftoles,* fome Guineas, and the reft *Moidores.* Now if a *Piftole* was worth 18 *s.* 6 *d.* a *Guinea* 1 *l.* 3 *s.* and a *Moidore* 1 *l.* 10 *s.* My *hundred Pieces* would be worth juft one *hundred Pounds. Quere,* How many I have of each Sort ?

III. QUESTION 246. *By Mr.* PETER KAY.

T O find the *Center* of *Ofcillation* of a *Pendulum,* whofe *Bob* is compofed of *two equal and fimilar parabolical Conoids,* joined together at their *Bafes* ; the Thicknefs of the *Bob* being three Inches, the *Diameter* of its greateft *Circle* feven *Inches,* and the *Diftance* of its *Center* from the Point of *Sufpenfion* 39,5 *Inches ?*

IV. QUESTION 247. *By Mr.* J. BETTS.

A Set of *Men* and *Women* were drinking together, and their Reckoning came to juft *fix Guineas* ; towards the difcharging of which, each *Man* agreed to pay a *certain Sum,* and each *Woman* the Square *Root* of the fame : Now it was found, if there had been as many Women, as there were *Men,* the Reckoning would have come to *half a Portugal* Piece lefs, or only to 4 *l.* 10 *s.* Again it was found, that each Man paid as many *Shillings* more than each *Woman,* as there were Women in Company. It is required, what Number of each, and what each paid ?

V. QUESTION 248. *By Mr.* WILLIAM DANIEL.

I N an *oblique-angled Triangle* (EGF) there is given the *Difference* of the *two Sides,* which compofe the *oblique Angle* (ED) = 2 ; the *Difference* of the *Segments* of the *Bafe* (EB) = 2,4 ; and the *oblique Angle* (EFG) = 112.37 : It is required to find all the other Parts of the Triangle.

VI. QUESTION 249. *By Mr.* WILLIAM BROWN.

I N the *Latitude* 52° 30', on the *tenth Day of June* (fuppofing it the longeft apparent Day) I afked a *Mathematical Friend,* what o'*Clock* it was ? who made me this puzling Anfwer: Count (fays the *Hours* from the vifible Time of the *Center* of the Sun's Rifing, and add their *Cube Root* to the *Square Root* of the *Hours,* to the apparent Time of its Setting ; and it will give you the *Hour* of the Day. Quere, What o'*Clock* was it ?

VII. QUESTION 250. *By Mr.* JOHN HILL.

T HERE is a *River,* whofe *Stream* is divided into *two Parts* ; and after running fome Space, the Waters are united ; between which it has inclofed an *Ifland* in the Form of a *Geometrical Ellipfis,* whofe *tranfverfe Diameter* is *forty Chains* (according to *Gunter*) conjugate = *thirty Chains.* Upon the tranfverfe Diameter is built a Farm or Cottage Houfe, 132 Yards from the Center; and as this

Piece

Piece of Land is to be divided by ſtraight Hedges from the Houſe to the Water, one of them, which ſhould be the ſhorteſt that can be made, is to convey the Water from the *River* to fill a *Ciſtern* by the *Cellar*. It is required, the ſhorteſt Diſtance, and the Poſition it will make with the Tranſverſe.

VIII. Question 251. *By Mr.* J. Powle.

TO determine the Law of the *Weights*, which preſs each Particle of a perfect *Flexible* Line, in ſuch manner, as that it ſhall form a *Curve*, whoſe *Equation* is $ax = y^4$?

IX. Question 252. *By Mr.* T. Sandalls.

IN an *oblique-angled plain Triangle* there is given the *Difference of the Sides*, which include the *Angle* of $112^\circ = 20$, and the *Perpendicular* let fall from that *Angle on the Baſe* $= 60$: it is required, a Theorem to determine the *Baſe*, and Sides of the *Triangle* ?

X. Question 253. *By Mr.* J. Powle.

GRanting the Reſiſtance, as the *Square* of the *Celerity*; in what Law of Denſity will a heavy Body moving deſcribe a *Curve*, whoſe *Equation* is $ax = y^3$?

XI. Question 254. *By* Diophantus.

SINCE the Doctrine of Triangles have an unbounded Uſe and Application in moſt Parts of the *Mathematicks*, and the Similarity of them generally had Recourſe to; let it be required to find *eight right-angled plain Triangles*, whoſe *Hypothenuſes* are all equal; and ſhew a general Method for determining the ſame.

XII. Question 255.

THE various Contrivances for meaſuring Time, have employ'd the Curious in all Ages; the true determining of which is a Matter of no ſmall Importance in Civil Life; and perhaps I may ſurprize ſome, if I ſay, *Algebra* is uſeful to know the *Time* of the *Day by a Clock*, when it cannot be done otherwiſe; which is the Reaſon for putting in this eaſy *Queſtion*, in order to convince others, the facetious *Hudibras* did not joke, when he ſays,

——And wiſely tell what Hour o'th' Day
The Clock does ſtrike, by *Algebra*.

The Question. Being at ſo large a Diſtance from the *Dial Plate* of a *great Clock*, that I could not diſtinguiſh the *Figures*; but as the *Hour and Minute Hands* were very bright and glaring, I could perceive that the *Minute Hand* pointed upwards to the *right Hand*, at the ſame time the *Hour Index* pointed downwards to the *Left*, ſo as both were in a *right Line*, or *diametrically oppoſite*, and in ſuch *Poſition*, that the *Elevation* (I gueſs'd) was ſome few Degrees more than five above the Horizon:

Quere, The Hour and Minute of the Day.

The PRIZE ÆNIGMA, and PRIZE QUESTION.

Whoever sends answers to them before Candlemas *next, has a Chance by Lots to win* twelve, eight, *and* ten Diaries.

PRIZE ÆNIGMA. *By Mr.* J. STEWART.

I Claim (ye fair ones know) my Race,
     Before one Thing was made ;
And fill'd the vast Extent of Space,
     Of ending not afraid :
Nay Heav'n itself, as some have said,
     By me at first was fill'd ;
The All, from whence all Things were made
     The Moment they were will'd.
In Senates, where the wise should be,
     And unto Sense confin'd,
That half they say relates to me,
     Is clear to all Mankind.
The Blind by me have no Relief,
     Yet I by them am seen ;
Heard I am also by the Deaf,
     But no Defects I screen.
The Saint his Word will break for me,
     But yet in Reason's spite ;
From me the Hero'll choose to flee,
     With me the Coward fight.
When Noise thro' Streets with Fury's hurl'd,
     Which senseless Mobs do form,
I join in with the Rabble World,
     The humble Mind I scorn.
Nor Time, nor Place, on me ('tis strange)
     Can Alteration frame ;
From what I was, shall never change,
     But always am the same.
What are the Effects that I produce,
     These mystic Lines may tell ;
I fill ('tis odd) the Poet's Purse,
     And with the Proud I dwell.
But, lovely Maids, to aid Surprize,
     And help your Thoughts sublime ;
I'm never seen by Vulgar Eyes,
     But now in ev'ry Line.
You who me call enlivening Springs,
     And riddling Wits of Fame,
Now should you guess a thousand Things,
     I think you'll miss my Name.

PRIZE QUESTION. By Mr. JOHN MAY, Jun. of Amsterdam.

AN *Architect*, or *Master-Carpenter* in Holland, had (from that slender Knowledge, which usually attends Mechanics) conceit enough to fancy, he could find the Dimension of any Piece of *Timber* in a *Building*, of which a Design should be given: A *Burgo-master* of the City of *Amsterdam*, intending to build a handsome House fronting the Street, where his Length was limited, because he would save the Charges of a *double Roof* and *Gutter*, and at the same Time put his best Side outward, gives the said *Architect* these Dimensions, *viz.* That the Building should be *forty Feet wide*, and the Front *Wall twelve Feet* higher than the *Back Wall*: Also, because too much of a large *Roof* should not appear in View of the Street, he will have the *Length of the Rafters*, from *Wall to Ridge*, on the back Side of his House, just 37 *Feet*; but the *Rafters* on the *Front Side* to be of such a *Length*, as may form the Pitch, or Steepness of the Roof, the same on each Side. The Owner being frugal (not to say wife) orders the Builder to fit down and count up the Cost: But altho' he was skilful in *Numbers*, and pretty well vers'd in some Parts of *Geometry*, yet he found the *first* would be so much *adfected*, and the latter only an *Approximation*, that he was not able to know how high *the Roof would rise*, nor the *Length of the Rafters in Front*, and therefore was incapable of computing the *Timber* and *Roofing*. The *Burgo-master* surpriz'd, probably thinking so fam'd an *Architect* must be little less than a *Conjuror* (when himself was none) resolves not to have his House begun, until he can have the Measures exact, and leaves him bare-brich'd, riding on the strange Roof, altho' he is furnish'd with *Mathematical Instruments*, to describe *Curves* and *Conic Sections organically*. But having heard of such Things being effected by *Geometrical Construction*, he has, thro' the Mediation of a Friend, apply'd to the Artists of *Great Britain*; and thinking the Author of the Ladies Diary deals in Quibbles and quaint Questions, hopes to see both Methods in the next Year's Production.

PARADOX, by YEWMAN PAMPHEY.

FAcetious *Hudibras* does say
  (Whose Wit you know is always gay)
   " That if you *spur* one Side o'th' *Horse*,
  " The other will not hang an *Arse*.
Yet I observ'd the other Day,
A *Horse* I met with by the Way,
Two of whose *Legs*, I plainly found,
Had travell'd *twenty Miles* of Ground;
The other two, as plainly seen,
Had only travell'd just *nineteen*:
Pray solve the seeming Contradiction,
That's free from *Quibble*, and from *Fiction*.

PARADOX

PARADOX, *by* Mr. RALPH HULSE.

I Have seen a Landskip, representing a Lady *sitting* on the *Grass*, and
an *Old Gentleman* lying in her *Lap* ; at a Distance *three Men*, of dif-
ferent Ages, coming down a *Hill* from a *Castle*, with this Motto :

MADAM, 1 pray you, unto me shew,
Who yond' *three be*, if them you know,
Who from the Castle come, in that Degree :
What is their *Lineage* and *Affinity* ?

She ANSWERS.

The *First* by my *Father's* Side is my *Brother*,
The *Second* is so on the Part of my *Mother* ;
The *Third* is my *Son*, lawfully begot,
And all *Sons* of my *Husband* lying in my *Lap*,
Without Hurt to *Lineage* in any Degree :
Tell me the Reason, how this can be ?

ERRATA *and* EMENDATIONS.

I May with Pleasure say, that I met with so good a Corrector of the
Press last Year, an ingenious Friend of mine, that the Diary was the
freest from Errors of any I have known published.

Mr. *James Terey* takes Notice, there was no Answer to the 212, in the
Diary 1739, except the Numbers in the Emendations 1741. But it was
fully answered by Mr. *Heath* that Year, tho' the Process was not inserted
there. Mr. *Terey* now puts the Side sought $= x$, from one Angle to the
Intersect $= d$, another $= c$, the 3d $= b$; then $x = \sqrt{2dd + 2cc - bb}$
Whence he gives the Sides 34.176 ; 28,844, and 20 ; the Area $= 288$.
Then 1 : ,6046 : : Area of the Equilat. $\triangle$: Area Inscr. Cir. Hence
Area of Inscr. Ellipsis $= 174,124$, and each angular Piece $= 37,95$;
Diam. Inscr. Cir. 10.88 $=$ conjugate of the Ellipte ; longest 20,36.

Mr. *Edw. Cross* sends his Solution to the 233 Quest. 1742, $x = 859,36$.

H Aving always a great Veneration and Regard for *Mathematics* and *Phi-
losophy*, and more especially for those Parts of them, which may be
applied to Use in the common Things in Life, and, with the Laws of
Motion and Mechanics, will furnish us with Reason and Judgment on
what is done, as well as what may, or cannot be done (the Application
of which will be the *Utile Dulci* of the Sciences) and having now gain'd a
little more Room in the Diary, the former Parts of it being taken
up in Speculation, Theory, and Curiosity ; it may not be amiss to spend a
few Lines annually in such Things as may be instructive and useful, by
addressing myself to those, whose Capacities and Education have not
either fitted them, or their Genius led them to regard the other.

In the next *Diary* I design to give a short, but plain, Account of the
Nature of Drawing Carriages, as Waggons, Coaches, Ploughs, &c. and
of the best Form and Make of them. And in this I shall not introduce
new Whims and Alterations ; for if the Farmer, Wheelwright, Coach-
maker, or Plow-wright, by a Series of Experiments and Improvements,
have brought these Things to such a Degree of Perfection, as will stand
the Test of Demonstration by the *universal Laws of Mathematics* and *Phi-
losophy* ;

lofophy ; I do not see why they should be difregarded. Therefore it may
not be amifs to examine into the Writers of _Mechanics_ and _Natural Philo-_
fophy, who have from time to time, in all their Books and Experiments,
been arguing for _High Wheels_, and in an upright Pofition, which muft
have put Mankind into a Method much worfe than what is at prefent us'd.
I humbly conceive, I fhall prove and demonftrate, that their Philofophy
is without any Reafon and Foundation, as being contrary to the Laws of
Nature, and their Experiments in fuch a manner made, as to delude and
deceive themfelves. My very worthy Friend Dr. _Defaguliers_, whofe fecond
Volume of _Philofophy_ is in the Prefs, and will foon be publifhed (to
whom I communicated what I had obferved as to Carriages fome Years
ago) will, amongft a vaft Variety of curious and ufeful Things, put this
Matter in a better Light than has ever yet been done.

To our MATHEMATICAL CONTRIBUTORS.

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An Alphabetical Catalogue _of_ Contributors _to this Diary_;
Shewing by the Numerical Letters i, ii, iii, &c. which ÆNIG-
MA's; and by 1, 2, 3, &c. what QUESTIONS, each anfwered.
Æ, Q. and P. denote the folving the PRIZE ÆNIGMA and
QUESTION, or propofing fome new ones.

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9. Mr. Tho. Atkinfon all En. 6. Mr. Sam. Bamfield all En. 1, 3,
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The firft Prize of 12 Diaries was won by Aaretta ; the fecond by Mrs. Eliz. Man ; the third by Mr. Ed. Crofs.

F I N I S.

ADVERTISEMENTS.

ALL Persons, who are pleased to be CONTRIBUTORS, by answering the ÆNIGMA's, QUESTIONS, &c. in this Diary; or by sending New Ænigma's, Questions, Paradoxes, or other Subjects fitting for this Work, are desired to send their Solutions with them, before the End of *May*, 1744, directed for the Author of the *Ladies Diary*, at Mr. *Simpson's*, at *Stationers-Hall, London*. Post paid.

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